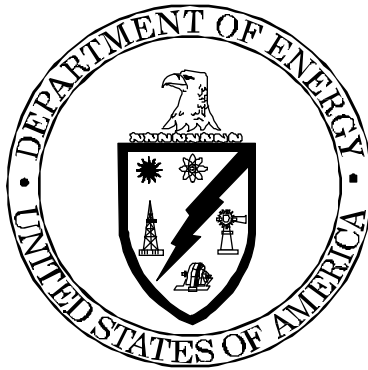


**Independent Oversight Evaluation of
Headquarters and Albuquerque Operations
Office Management of Environment,
Safety, and Health Programs at
The Los Alamos National Laboratory**



October 1996

**Office of Oversight
Environment, Safety and Health
U.S. Department of Energy**

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EXECUTIVE SUMMARY

EVALUATION: The Department of Energy Office of Environment, Safety and Health independent oversight organization evaluated safety management with respect to three of the DOE's guiding principles for safety management: 1) line managers are responsible and accountable for safety; 2) comprehensive requirements exist, are appropriate, and are executed; and 3) competence is commensurate with responsibility.

SITES: Los Alamos National Laboratory

DATES: August to October 1996

BACKGROUND

This Oversight evaluation selectively sampled various environment, safety, and health (ES&H) programs at the Los Alamos National Laboratory (LANL). LANL is managed by the Albuquerque Operations Office (AL), with programmatic direction provided by the Department of Energy (DOE) Headquarters Offices of Defense Programs (DP) and Environmental Management (EM). AL's Los Alamos Area Office (LAAO) provides a continuous onsite DOE presence and day-to-day direction to contractors at the LANL. Under contract to the DOE, the University of California (UC) operates LANL. Oversight's evaluation of LANL reflects the performance of the line management chain responsible for the LANL site—DP, AL, LAAO, UC, and selected LANL subcontractors.

Located in northern New Mexico, LANL performs research and development as part of its nuclear weapons mission and conducts numerous research and development programs in nuclear science and many other areas. LANL was instrumental in the development of the nation's nuclear weapons program, and much of the nation's nuclear weapons design and certification expertise and stockpile maintenance capability resides at LANL. Further, as other DOE facilities are transferring to environmental management missions, LANL is the only remaining DOE facility with capabilities to perform some of the vital stockpile maintenance activities.

The ongoing activities at LANL involve inherent hazards, including large quantities of nuclear materials, that must be carefully managed and controlled. The LANL safety management system must be sufficiently flexible to accommodate a wide range of activities with different types of hazards—plutonium processing, high-explosive machining, accelerator operations, laser isotope separation, fusion research, and experiments in all aspects of plutonium and uranium chemistry and metallurgy, to name just a few.

In evaluating safety management at LANL, the Office of Oversight evaluation team is especially sensitive to the differences between research laboratories and production facilities (e.g., development and modification of equipment are routine activities in a research environment). Nevertheless, Oversight believes that fundamental safety principles apply to all types of missions and facilities and has developed an evaluation methodology that is sufficiently flexible to encompass all DOE facilities.

RESULTS AND CONCLUSIONS

Although initiatives are under way, the safety management program at LANL is not currently achieving the desired level of performance. There are weaknesses in many ES&H programs, most notably work planning and control, conduct of operations, maintenance, and electrical safety. While these weaknesses are

significant and recognized by DOE and LANL as requiring improvement, no conditions were observed that warranted cessation of operations.

DP, AL, LAAO, UC, and LANL management have recognized the need to upgrade safety performance for some time and have taken steps to achieve improvement. Most notably, LANL has initiated a number of programs to address safety management deficiencies and improve performance. From the sitewide perspective, these initiatives are conceptually sound and are appropriately focused on the highest priorities, such as poorly defined standards and work planning processes. The "Safety First!" initiative, championed by the LANL Director, establishes management's intent that safety is the number one tactical goal at LANL. The initiatives are also appropriately coordinated within the framework of the DOE integrated safety management system, and provide a good conceptual framework for establishing clear roles and responsibilities and holding individuals and organizations responsible for performance. The sitewide approaches and clear priorities indicate that senior management has a good awareness of the weaknesses at LANL.

In areas where attention has been focused for some time, improvement has been noted. For example, the plutonium facility, TA-55, is a high priority for DOE's stockpile stewardship program. Consequently, it has received considerable mentoring assistance and investment of financial resources, and is the "flagship" for the LANL facility management model, which is the centerpiece of the integrated safety management initiative. Although much work remains, some of enhancements at TA-55, such as management walkarounds, aggressive contamination controls, and formal resource planning, have been successful in improving safety.

Some of the common trends that were evident during this evaluation and that contribute to weaknesses in implementing requirements include: at the institutional level, controls and standards are not available to guide effective implementation across the site; at the facility level, organizational structure and interfaces are not present to implement effective programs and procedures; and at the facility and activity level, work planning and control are not defined, and hazards have not been analyzed with sufficient rigor.

Currently, DP, AL, LAAO, and LANL do not have the effective infrastructure necessary to ensure that ES&H requirements are accurately reflected in procedures and effectively implemented. For example, responsibilities and authorities are not clearly defined so that individuals clearly understand what is required to implement their safety management responsibilities. Improvement is also needed in systems to ensure that organizations and individuals are consistently held accountable for performance, and that requirements are clearly defined and communicated. Weaknesses exist in systems intended to provide an accurate picture of LANL's ES&H status to DP, AL, LAAO, and LANL managers. Consequently, in some cases, DOE and LANL management do not fully understand the current effectiveness of safety performance or progress in effecting change through safety initiatives. The oversight safety management evaluation team believes that the deficiencies in the safety management program elements and infrastructures have been contributing factors to the recent accidents and near misses. The recent accident investigations at LANL and internal reviews by UC have reached similar conclusions.

The various sitewide initiatives represent a positive step in addressing the concerns identified in this evaluation and previous investigations and reviews. To date, most sitewide initiatives are still in development or in the early stages of implementation, and are only beginning to have a significant positive impact on performance. For example, efforts to translate institutional-level ES&H policies into measurable and meaningful facility- and activity-specific policies, goals, objectives, and plans that identify actions and milestones have not yet been accomplished. As a result, the formality and rigor with which ES&H initiatives are proceeding vary significantly among the facilities reviewed. In addition, although the DOE and LANL initiatives are conceptually sound, they have not addressed some significant areas that require

improvement, such as DOE (DP, AL, and LAAO) roles and responsibilities, weaknesses in corrective action management, or information flow for management decision making.

The LANL safety management program and performance need to be improved, and in some cases, significantly increased management attention is warranted. Although recent initiatives are encouraging, line management has not yet established the necessary systems to effectively implement its responsibility for safety, and requirements are not adequately identified and implemented. In some cases, organizations within AL, LAAO, and LANL do not have sufficient qualified personnel, and training programs have not consistently ensured that individuals are provided the training necessary to perform their assigned duties effectively. However, AL, LAAO, and LANL personnel generally have considerable education and experience; their technical competence enables them to recognize and mitigate hazards and partially compensates for other weaknesses.

With sustained DP, AL, LAAO, and LANL management attention and commitment, the LANL initiatives have a high potential to address many of the identified concerns. While many issues raised in previous evaluations at LANL have not yet been fully addressed and aspects of LANL safety management still have weaknesses, the support for the recent initiatives on the part of senior DOE and LANL managers, including assigning a LANL senior manager to champion each of the key initiatives, is encouraging. To implement DOE's safety responsibilities, DP and AL must continue to implement improvements, address the root causes and underlying factors that have contributed to recurring problems, ensure that initiatives are seen through to completion, and ensure that safety is viewed as an ongoing responsibility at every level of the organization.

OPPORTUNITIES FOR IMPROVEMENT

The following opportunities for improvement have been identified. These opportunities are not prescriptive but may contribute to the success of the integrated safety management program.

1. Enhance communications, coordination, and cooperation among DP, AL, LAAO, and contractor management by identifying inconsistencies and redundancies and clarifying roles, responsibilities, interfaces, and lines of authority.
2. Identify approaches that senior line management could adopt to ensure timely and effective implementation of LANL safety management initiatives by developing detailed implementation strategies leading to increased management involvement and visibility, and clarifying interfaces and interrelationships among many initiatives.
3. Increase organizational and individual accountability for ES&H performance within DOE and contractor organizations.
4. Develop and implement management systems that provide continuous and accurate information on ES&H performance and that assist management and staff in assessing the effectiveness of the safety management program and in making decisions about resolution of ES&H issues.
5. LANL senior management should take proactive control of changing the Laboratory culture towards procedural adherence and use.
6. Ensure that effective interim measures are in place to protect the health and safety of workers, the public, and the environment pending the full implementation of significant new safety management initiatives in requirements, work planning and control, and electrical safety.

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ACRONYMS AND INITIALISMS

AL	Albuquerque Operations Office
CMR	Chemical and Metallurgy Research Facility
CST	Chemistry, Science and Technology Division
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DP	U.S. Department of Energy Office of Defense Programs
EH	U.S. Department of Energy Office of Environment, Safety and Health
EM	U.S. Department of Energy Office of Environmental Management
ESH	Environment, Safety and Health Division
ES&H	Environment, Safety, and Health
FSAR	Final Safety Analysis Report
FSS	Facilities, Safeguards and Security Division
FY	Fiscal Year
JCI	Johnson Controls, Inc.
LAAO	Los Alamos Area Office
LANL	Los Alamos National Laboratory
ORPS	Occurrence Reporting and Processing System
OWG	Operations Working Group
PAM	Performance Assessment Matrix
PHA	Preliminary Hazards Analysis
SAR	Safety Analysis Report
STTP	Actinide Source Term Waste Test Program
TSR	Technical Safety Requirement
UC	University of California
USQD	Unreviewed Safety Question Determination

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Independent Oversight Evaluation of Headquarters and Albuquerque Operations Office Management of Environment, Safety, and Health Programs at The Los Alamos National Laboratory

1.0 INTRODUCTION

An independent oversight safety management¹ evaluation of the Albuquerque Operations Office's (AL's) Los Alamos National Laboratory (LANL) was conducted from August through October 1996 by the Office of Oversight, U.S. Department of Energy (DOE). The purpose of the evaluation was to determine how effectively DOE and contractor line management² have implemented safety management and environment, safety, and health (ES&H) programs at LANL.

This evaluation was conducted as part of the Department's independent oversight program, which was consolidated in December 1994 under the Office of Environment, Safety and Health (EH) into the Office of the Deputy Assistant Secretary for Oversight. A major objective of the Office of Oversight is to provide the Secretary of Energy; Deputy Secretary; Under Secretary; DOE program, field, and contractor managers; the Assistant Secretary for Environment, Safety and Health; Congress; and the public with accurate and comprehensive information on and analysis of the effectiveness of the Department's ES&H programs.

The DOE Headquarters Office of Defense Programs (DP) is the cognizant secretarial office for LANL and is primarily responsible for program development and direction of most activities reviewed during the evaluation. In addition to DP, other DOE Headquarters offices also have significant roles in the programs at LANL. The DOE Headquarters Office of Environmental Management (EM) has ongoing environmental restoration and waste management at LANL. As a multi-program laboratory, LANL receives funding and programmatic direction from

The Office of Oversight evaluated safety management programs at the Albuquerque Operations Office (AL) Los Alamos National Laboratory (LANL) site from August through October 1996.

The Headquarters Office of Defense Programs (DP) is the cognizant secretarial office.

¹Safety management refers to those measures required to ensure that an acceptable level of safety is maintained throughout the life of a facility or installation. The term "safety" when used in the context of safety management or safety management program specifically includes all aspects of environment, safety, and health programs.

Secretary through the Deputy Secretary or Under Secretary to the cognizant secretarial officers, field organization managers, and contractors. Line management consists of DOE and contractor personnel organizationally or contractually responsible for work or job tasks, as well as effective safety.

many DOE programs and offices, including DP, EM, Nuclear Energy, Energy Research, Fossil Energy, and Nonproliferation and National Security; other government agencies, such as the Department of Defense, the National Institutes of Health, and the Federal Bureau of Investigation; and the commercial sector through Cooperative Research and Development Agreements and other arrangements.

AL is responsible for managing activities at LANL, as well as a number of other major sites and smaller sites. AL is located in Albuquerque, New Mexico, and has area offices at each of its major sites. AL's Los Alamos Area Office (LAAO) provides day-to-day direction to contractors and a continuous onsite presence at the LANL site. Some ES&H functions are performed by AL personnel in Albuquerque, while other ES&H functions have been delegated to the area offices.

The University of California (UC) has operated LANL since its inception. As a subcontractor to UC, Johnson Controls, Inc. (JCI) is responsible for site activities such as maintenance and instrument calibration.

Figure 1 shows a simplified depiction of the roles and responsibilities of the various organizational entities involved in the LANL line management chain. Oversight's evaluation of LANL reflects the performance of the line management chain responsible for the LANL site—DP, AL, LAAO, UC, JCI, and selected LANL subcontractors.

LANL was originally established in 1943 by the U.S. Army's Manhattan Engineer District to develop the first atomic weapon. The primary mission has been nuclear weapons research and development. Many other programs are now conducted at LANL in nuclear, environmental, and energy sciences; fusion; laser isotope separation; and basic research in physics, chemistry, radiology, and medicine.

Although primarily a research facility, LANL is engaged in processing activities to some extent. For example, LANL activities in the plutonium facility at TA-55 are oriented toward processing. LANL has facilities in various stages of their life cycle: design, construction, operations and maintenance, decontamination and decommissioning, and environmental restoration.

Table 1 provides an overview of the facilities, programs, and focus areas that were evaluated. It also summarizes the principal hazards at the facilities reviewed on this Oversight evaluation.

In evaluating safety management, Oversight is especially sensitive to the significant differences between research laboratories and facilities with a production, processing, assembly/disassembly, staging, and/or storage mission.

AL manages LANL activities through its Los Alamos Area Office (LAAO).

LANL is a multi-program laboratory whose primary mission has been nuclear weapons research and development.

Primary Role

Program Direction
Funding

Program Management
Technical Support
Pilot Assessment

Onsite Presence
Day-to-day Direction
Assessments

Program Implementation
Facility Management
ES&H Implementation

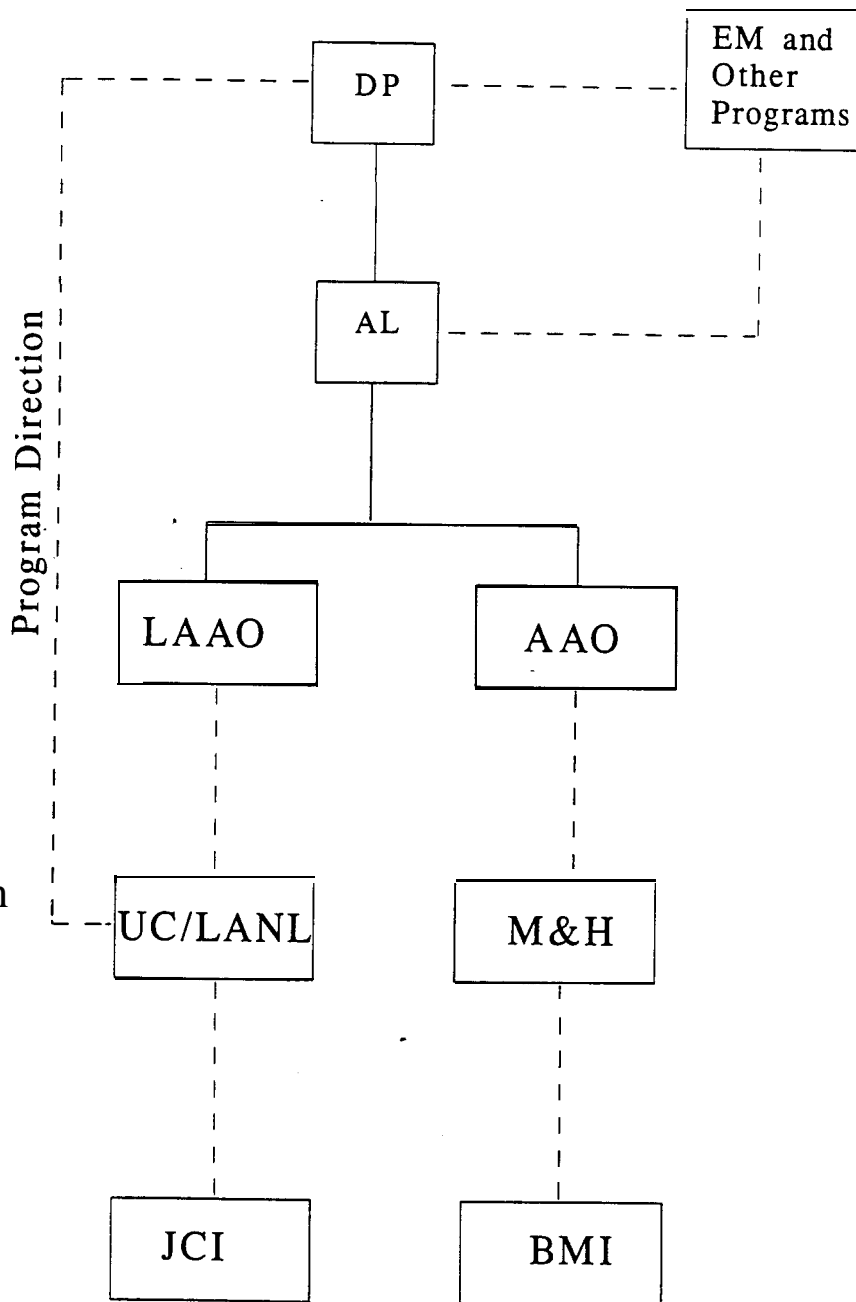


Figure 1. LANL Safety Management Organizations

Table 1. LANL Facilities and Hazards

SITE OVERVIEW	<ul style="list-style-type: none"> ■ Located on the Pajarito Plateau about 35 miles northwest of Santa Fe, New Mexico. ■ Covers more than 43 square miles of mesas and canyons. ■ LANL has approximately 7,000 University of California employees and approximately 3,500 subcontractor personnel. ■ Annual budget is approximately \$1 billion. ■ LANL is divided into a number of Technical Areas, of which 42 are now actively used for various scientific projects. ■ Facilities within these areas include a shut down reactor; critical experiment areas; particle, neutron and ion accelerators; sealed source and x-ray radiography facilities' research laboratories; depleted uranium and explosive test facilities; radiologically contaminated areas in various stages of remediation; decontamination and decommissioning projects; and operating plutonium process facilities.
FACILITIES REVIEWED	<ul style="list-style-type: none"> ■ TA-55 - Plutonium Facility (PF-4) - an operational plutonium processing facility ■ TA-3 - Chemical and Metallurgy Research (CMR) Facility - a multi-disciplinary laboratory performing varied research projects ■ TA-21 - DP West Environmental Restoration and Decontamination and Decommissioning Project - an ongoing environmental restoration, decontamination, and decommissioning effort at small facility ■ TA-53 - Los Alamos Neutron Science Center (LANSCE) - a research facility with a proton linear accelerator
HAZARDS	<ul style="list-style-type: none"> ■ As of February 1996, LANL had 2.7 metric tons of plutonium stored in over 20 facilities. This material is in various physical and chemical forms, including metal pits, fabricated weapon shapes, plutonium compounds and alloys, and a broad range of scrap/residues. ■ Other radioactive materials include uranium, tritium, americium, strontium, cesium, cobalt, contaminated facilities, and radioactive and mixed waste. ■ Chemical hazards include chlorine, sulfur dioxide, hydrogen cyanide, ammonia, acids, caustic materials, and various industrial chemicals and solvents. ■ Other hazards include construction and decontamination and decommissioning activities and work in areas with chemical processes, high voltage, heavy equipment, high energy steam, or rotating machinery.

Table 1

There is a need to recognize that researchers must often take initiatives and perform non-routine actions. For example, development and modification of equipment are routine parts of an active researcher's job. Nevertheless, there is a need for implementing basic safety principles in research activities. It is important to balance the appropriate application of safety procedures against the need for innovation in scientific research. In work environments that involve the use of hazardous materials in non-routine and dynamic situations, it is imperative that management establish and enforce compliance with fundamental safety management principles and that scientists be trained in hazards analysis and control. It is essential that research activities be performed within a well defined safety envelope and governed by an appropriate graded approach to procedures that are commensurate with hazards.

Oversight's evaluation approach is based on the fundamental premise that line managers are responsible for managing safety through proper work planning, hazards analysis, and hazard control. The adequacy of the systems, processes, and procedures managers use to assure environmental protection and worker health and safety are assessed against

At LANL, applying procedures without compromising safety or stifling research is a challenge.

In all facilities, safety must be commensurate with hazards.

a set of clearly defined principles and accompanying criteria.³ The three guiding principles of safety management that apply to line management are:

- Line managers are responsible and accountable for safety.
- Comprehensive requirements exist, are appropriate, and are executed.
- Competence is commensurate with responsibility.

This generic framework can accommodate the wide range of operations, hazards, and management styles, and is suitable to both research and operational facilities.

Section 2 presents the most significant evaluation results and Oversight's assessment of the effectiveness of the safety management programs at LANL. Section 3 identifies and discusses opportunities for enhancing safety management programs affecting those facilities.

Appendix A of this report provides additional details on the evaluation approach, criteria, rating system, and process and identifies the members of the Oversight evaluation team. It contains the full text of the evaluation criteria, which serve as a template for an effective safety management program, and provides important detail for readers who are not already familiar with the guiding principles of safety management and associated criteria.

2.0 LOS ALAMOS NATIONAL LABORATORY

This section summarizes the results of the LANL safety management evaluation. It provides an overall assessment of the program status and discusses the safety management program's effectiveness with respect to the three guiding principles. The ratings assigned to the DP, AL, LAEO, and LANL safety management program are presented at the end of the section.

Overall Assessment of LANL Safety Management Programs

DOE and LANL management are currently coping with changing budgets, staff downsizing and restructuring, aging facilities, and changing requirements, all of which present a significant challenge to the safety management system. Local governments, community groups, and

Management is coping with a number of challenges to the safety management system.

³Five guiding principles are identified by DOE: line management responsibility for safety, comprehensive requirements, competence commensurate with responsibilities, independent oversight, and enforcement. The last two are performed by the Office of Oversight and other Departmental elements. The evaluation of Los Alamos National Laboratory, therefore, focused on their effectiveness in implementing the first three of the five guiding principles, which are directly applicable to line management.

the public who live near and work at the site are particularly interested in LANL operations, both because of its importance to the local economy and because of the concerns about perceived risks associated with LANL operations.

LANL has a number of potentially effective initiatives under way, and some facility-specific elements are very effective. However, the safety management program at LANL has not yet achieved the level of performance expected of DOE sites.

DOE and LANL senior management have recognized the need to upgrade safety performance for some time and have taken steps to achieve improvement. Figure 2 summarizes some of the key ongoing initiatives designed to improve safety management and safety performance at LANL. From the sitewide perspective, these initiatives are conceptually sound and provide a framework for improvement. The "Safety First!" initiative, championed by the LANL Director, establishes management's intent that safety be the number one priority at LANL. The integrated safety management model, which has the facility management model as its centerpiece, provides a good framework for establishing clear roles and responsibilities and holding individuals and organizations accountable for performance. Recognizing that there are many deficiencies to address, the Operations Working Group (OWG)—which is composed of senior LANL managers representing all divisions, co-chaired by the LANL Deputy Director, and includes representatives from LAAO—has established five areas to focus on as the initial priorities. The sitewide approaches and priorities indicate that senior management has a good general understanding of the weaknesses at LANL.

In areas where attention has been focused for several years, improvement has been observed. For example, because of its importance to DOE's stockpile stewardship function, TA-55 has received considerable management attention, investment of resources, and mentoring assistance (which involves providing expert assistance to help the TA-55 managers and staff improve operational safety). TA-55 has also been designated as LANL's "flagship" for implementation of the facility management model⁴ and the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 95-2 approach to integrated safety management. Significant improvement has been noted in some areas of TA-55, although much work remains.

Safety management performance needs improvement.

Recognizing this need, senior management has taken a number of positive steps to improve safety.

Management attention has led to improvements in some areas, though many initiatives are still in the formative stage.

⁴The facility management model is LANL's approach to better control work authorization and conduct of work within a facility. In this model, facility management is accomplished by organizations that do not have programmatic activities. Personnel in these organizations are responsible for ensuring that activities are conducted within the authorization basis and are consistent with ES&H policies and approved practices.

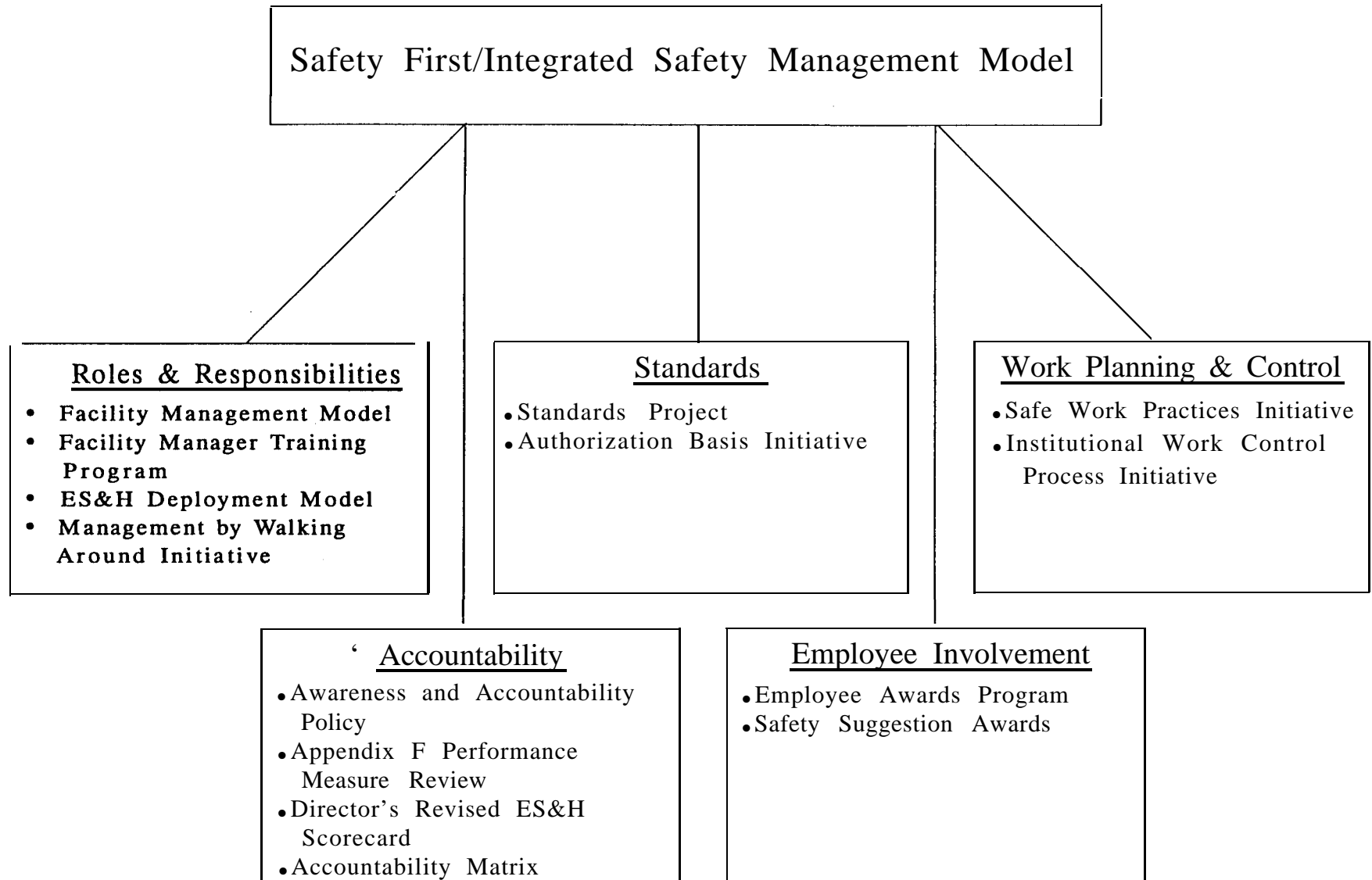


Figure 2. LANL Safety Management Initiatives/Activities

Some of the sitewide initiatives are still in development or in the early stages of implementation and are only beginning to have a significant positive impact on performance. For example, the LANL approach to integrated safety management provides a sound policy framework, but many specific policies and goals required for productive interaction and communications among organizations and elements involved in the implementation of the integrated safety management system do not exist or are not well articulated, understood, or accepted. Some aspects of the integrated safety management approach are best characterized as a conceptual approach or vision, rather than a plan that can be readily implemented; implementation of the facility management model is hindered by slow progress in standards, authorization basis, and safe work practices (work planning and control).

The most significant weaknesses are in two of the three applicable guiding principles: line management responsibility for safety, and comprehensive requirements. In some areas of the DP, AL, LAAO, and/or LANL programs, responsibilities and authorities are not clearly defined so that individuals clearly understand what they are required to do to implement their safety management responsibilities; organizations and individuals are not consistently held accountable for performance; requirements are not adequately identified and implemented; work planning is not consistently performed and controls are not consistently implemented, even when the required actions are clearly specified; and systems to provide an accurate picture of LANL's ES&H status are fragmented and incomplete. With these deficiencies, the safety management program does not yet have the infrastructure needed to ensure effective performance or to ensure that DOE and LANL management have a full understanding of the extent and significance of weaknesses or the progress made in correcting identified weaknesses in implementing initiatives.

Although the DOE and LANL initiatives are sound and represent a path forward to addressing the identified weaknesses, there are a number of residual concerns. For example, the initiatives do not address significant problem areas, such as the DOE (DP, AL, and LAAO) roles and responsibilities, weaknesses in corrective action management, or information flow for management decision making.

Over the last two years, there have been four serious accidents, including one fatality, and several near misses. While some might argue that accidents at LANL have been random events, it appears that deficiencies in the safety management program elements have contributed to the recent serious accidents and performance problems in the implementing programs.

Of the 15 programs evaluated, four were judged to be effective, seven were determined to require improvement, and four (work planning and control, conduct of operations, maintenance, and electrical safety) were judged to have significant weaknesses. Further, the factors that were identified on previous accident investigations and other reviews, some dating back several years, are still evident today. For example,

Overall, the LANL safety management infrastructure does not ensure effective performance.

The initiatives do not address some concerns, such as corrective action management.

Observed deficiencies in safety management program elements appear to have contributed to recent accidents.

procedures often do not specify what is allowed and what is not, and required actions are sometimes not performed.

Overall, the LANL safety management program and performance in each of the three guiding principles need improvement, and there are significant weaknesses in some aspects of the program. Although recent initiatives by AL, LAAO, and senior LANL managers are encouraging, line management has not yet adequately established the necessary systems to effectively implement its responsibility for safety, requirements are not adequately identified and implemented, and several aspects of the qualifications and training of AL, LAAO, LANL, and subcontractor personnel need improvement. The technical competence of personnel, however, is a strength that partially compensates for the significant weaknesses in other areas. With sustained AL, LAAO, and LANL management attention and commitment, LANL's positive initiatives have the potential to address many of the identified concerns.

Guiding Principle #1 - Line managers are responsible and accountable for safety.

Policy and Goals. DOE and LANL senior management have recognized the need to upgrade safety performance for some time and have taken steps to achieve improvement. Recent initiatives by LANL senior management have focused on strengthening policies and goals at the institutional level. Various documents, such as Director's Policies, the Tactical Plan, and the Institutional Plan, describe ES&H policy, goals, and tactical plans. These documents lay out a sound framework for improving the LANL safety management program. In addition, LANL's integrated safety management system is conceptually sound and consistent with the DOE response to DNFSB Recommendation 95-2. LAAO and LANL management have created effective mechanisms to involve stakeholders, including Federal and state organizations and the Citizen's Advisory Board, in issues related to ES&H policy and goals.

The Tactical Plan, which is intended to provide short term focus to Laboratory activities over the next three years, identifies "Safety First!" as the first tactical goal and broadly identifies ES&H as an integral part of Laboratory operations. The elements of "Safety First!" are consistent with the five current institutional priorities as defined by the OWG (standards, authorization basis, facility management, safe work practices, and awareness and accountability), which are the mainstay of the LANL approach to integrated safety management. Although senior LANL managers are involved in the development of these institutional priorities, the metrics used to ascertain progress generally focus on schedule commitments, are broadly defined, and except for the Appendix F criteria, do not correlate with specific measures for judging the effectiveness of the tactic.

Program weaknesses are partially mitigated by the technical competence of Department of Energy (DOE) and LANL personnel.

Recent initiatives, such as the LANL Tactical Plan, focus on strengthening safety management policy and goals.

Management attention is needed to develop practical implementation strategies.

LANL has devoted significant effort to developing approaches to safety management, but has not been fully effective in ensuring that these approaches are effectively implemented. The operational environment at the site is complex, and additional effort will be required to develop implementation strategies that include practical approaches to carrying out the planned actions. In some cases, initiatives are not well coordinated and do not appear to be well planned, making it difficult to achieve desired results within a specified time period. For example, institutional programs and standards necessary to effectively implement the facility management model are not in place (e.g., work planning and control, and electrical safety).

Although institutional-level policies and goals have been significantly strengthened by recent LANL management actions, efforts to translate the institutional-level ES&H policies into measurable and meaningful facility- and activity-specific policies, goals, and objectives must be strengthened to ensure effectiveness and timeliness. The degree to which ES&H policy and goals are effectively communicated and understood varies significantly among the facilities reviewed and depends largely on the initiatives of individual division directors, group leaders, facility managers, and team leaders, and not on a systematic approach that is consistent with the level of facility utilization and identified hazards. With some exceptions, facility-specific policy is generally not well understood by the facility workforce. A number of factors, such as resistance to change (e.g., prior landlords converted to tenants who exhibit some reluctance to relinquish authority and control over equipment and space to the facility manager) and facility complexities (e.g., single, multiple, or newly acquired missions; multiple and transient tenants), contribute to the difficulties associated with implementing institutional-level policies and goals at the facility level.

UC and LANL senior management have taken a number of actions to improve safety, and following the July 1996 electric shock accident, have taken action to further emphasize safety. The stand-down of all activities at LANL, subsequent to this accident, was a highly visible action that ensured that the entire workforce was made aware of ES&H policies and goals. The individually-signed safety commitments also reinforce this awareness. In addition, the LANL Director and other managers have recently communicated the rationale for changes and reemphasized safety's priority to the LANL workforce in a variety of media, such as employee newsletters. These recent LANL senior management actions have begun to communicate institutional ES&H policies and goals to the lower-tier managers and the workforce. Sustained and demonstrated commitment will be needed to ensure that the workforce understands the policies and modifies their behavior accordingly. Senior managers demonstrated a good understanding of policies, goals, and initiatives. Interviews with lower tiers of management, supervisors, and workers did not indicate the same level of awareness of facility-specific policies and goals, and the relationship of those policies and goals to the individual's work assignments.

Understanding of environment, safety, and health (ES&H) policies and goals varies among the facilities.

Understanding of safety policies and goals is not evident in lower tiers of management and the workforce.

The understanding of roles and responsibilities is not uniform for both DOE and LANL.

Roles and Responsibilities. The extent to which authorities, roles, responsibilities, and functions for ES&H are defined, communicated, and understood varies across the site among managers and workers for both DOE and LANL. Figures 3 and 4 show simplified versions of the organizational structure and interfaces for DOE and LANL.

In general, roles and responsibilities are defined for senior DOE and LANL managers (e.g., division directors) and become increasingly less well-defined at lower tiers of the organizations, especially at LANL. With few exceptions, existing definitions are ambiguous and conflicting, and are not traceable from top-level management down to the workers. This inhibits implementation of, and accountability for, effective safety management. Efforts to remedy this situation are not well coordinated.

Authorities, roles, and responsibilities are not well defined for organizations and personnel within DP. DP's initial attempts to define organizational roles and responsibilities within DP and between Headquarters and field offices have not been finalized. Consequently, important relationships within and among DP and its field offices have not been clearly defined. For example, while approval authority for positive unreviewed safety questions rests with DP, in at least one instance LAAO gave conditional approval for continued operation at a facility outside its authorization basis in anticipation of DP approval. Conversely, the flowdown of ES&H responsibilities from EM to the field is better defined and well documented.

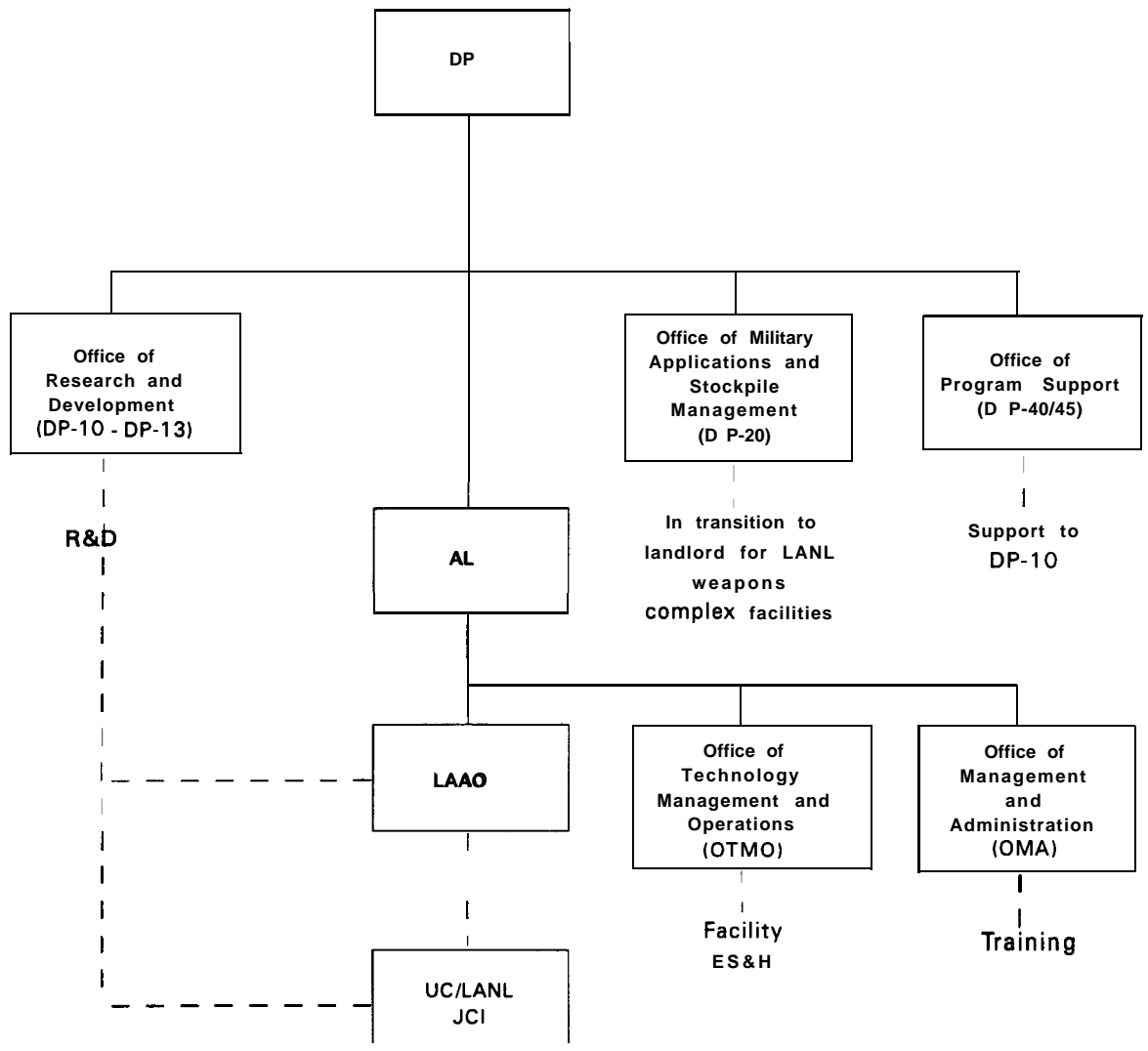
Changes in the Department's nuclear weapons manufacturing complex, such as downsizing and facility closures, evolving missions, and changing organizational roles, have impacted the responsibilities of AL and LAAO. While efforts to clarify roles and responsibilities and revise AL's documentation—AL 1120, Organizations, Authorities, and Functions and an AL Functions, Assignments, and Responsibilities (FAR) Manual—are in progress, organizational functions are not completely understood by AL and LAAO personnel. For example, it is not clear whether AL or LAAO radiological protection personnel are responsible for resolution of corrective actions for followup and closure of the findings from the October 1995 AL assessment of LANL.

In addition to problems with coordinating between the various levels of the DOE line management chain, responsibilities for individual AL and LAAO managers and ES&H professionals have not been clearly delineated and communicated. For example, clarification of responsibilities for industrial hygiene and industrial safety personnel has not

DP roles and responsibilities are not well defined.

Efforts are under way to clarify AL and LAAO roles and responsibilities.

Certain responsibilities are not clearly apportioned among managers and ES&H professionals.



*EM provides direction on environmental restoration and waste management (not shown on figure).

Figure 3. DOE Organizational Structure

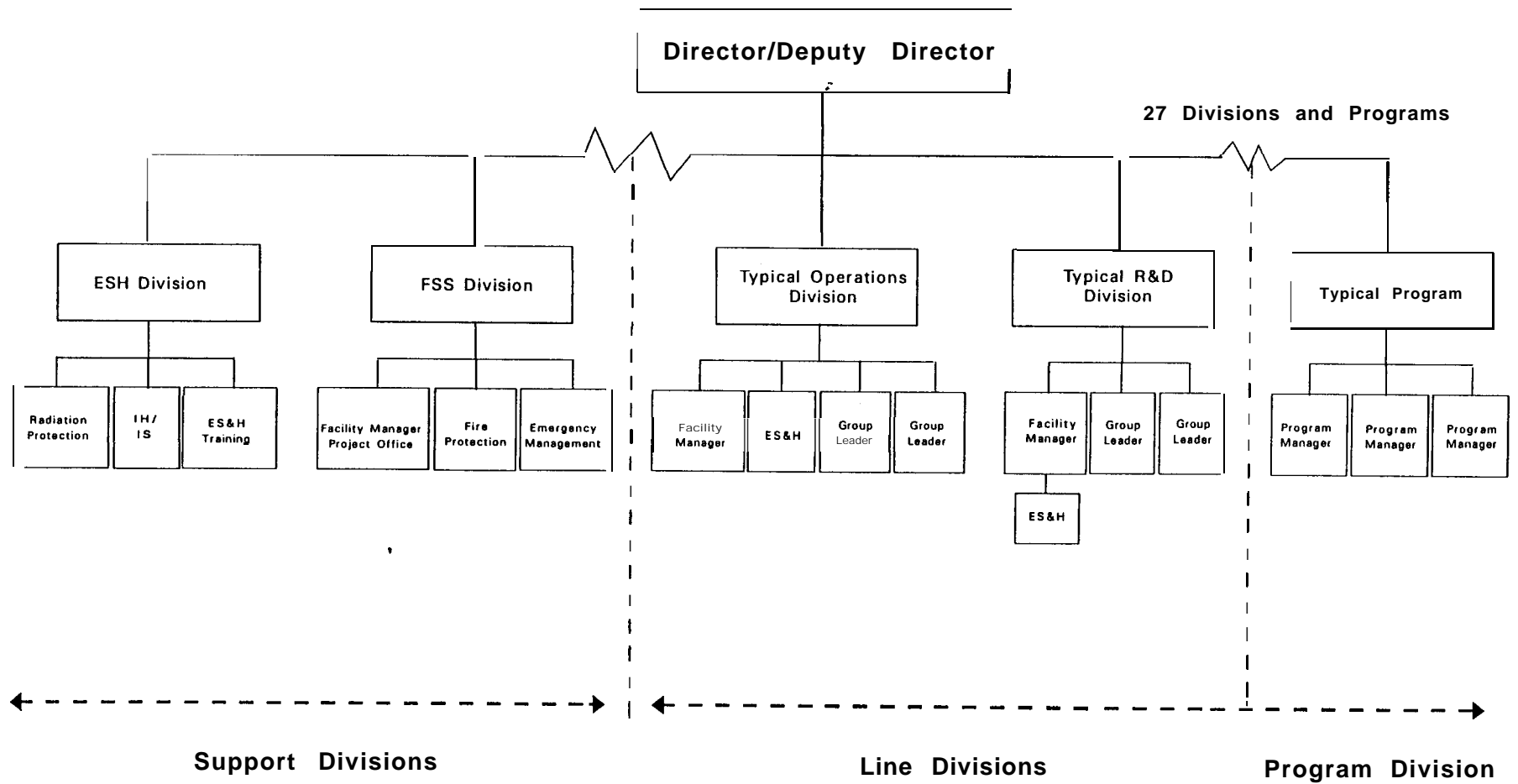


Figure 4. LANL Organizational Elements

kept pace with the informal shift of many AL oversight functions to LAAO. Responsibility for ensuring followup of DOE-identified safety deficiencies is captured in AL and LAAO documents. However, such assignments are ambiguous and not clearly communicated to AL and LAAO personnel. Conversely, the roles and responsibilities of LAAO Facility Representatives appear to be effectively communicated and understood.

LAAO and LANL have formal "partnering" agreements for certain functions, such as environmental management. According to these agreements, LAAO and LANL jointly share certain responsibilities and cooperate to achieve goals. This approach has some positive aspects, such as facilitating communication and cooperation between LAAO and LANL, improving working relationships, and reducing barriers that stand in the way of achieving common goals. In some cases, however, the partnering approach has resulted in ambiguity in the roles of LAAO technical representatives, who are responsible for both working jointly with LANL in a cooperative assistance role and performing critical assessments of contractor performance. The effectiveness of LANL waste management programs has been strengthened by the oversight and technical assistance provided by LAAO personnel. Unless carefully managed (including provisions for some independent quality assurance and evaluation of performance), the partnering relationship could dilute the objectivity of LAAO personnel and compromise the LAAO ES&H oversight function.

Roles and responsibilities of LANL managers are described in uncontrolled institutional-level documents transmitted by memorandum. Workers' safety responsibilities are not addressed at the institutional level but are addressed in group-level documents, such as position descriptions. These documents have not kept pace with LANL organizational and functional changes, resulting in inconsistent interpretation of, and considerable variation in, the roles and responsibilities among facilities and organizations. This is especially visible when new initiatives are undertaken. Roles and responsibilities range from well defined and understood for managers and workers associated with LANL's occupational medicine program to neither defined nor understood by cognizant LANL managers and associated subcontractors for implementing construction safety requirements.

One important LANL initiative is the deployment of the Environment, Safety and Health (ESH) Division industrial hygiene and industrial safety personnel to support line organizations to strengthen line functions. However, implementing deployment without clearly defining the relative institutional (i.e., core) and line organization roles and responsibilities of the individual fosters conflict. Without management attention, this could jeopardize both the integrity of the core program and the appropriateness of the technical support provided to the line.

"Partnering" has some positive aspects, but sometimes leads to ambiguity in roles.

Roles and responsibilities for LANL managers and workers are not uniformly defined or understood.

One of the most important aspects of implementing the LANL facility management model is clarity of roles, responsibilities, and authorities of the facility managers. The facility manager has extensive responsibilities and, as shown in Figure 5, must interface with many groups and organizations at LANL. A self-study course provides facility managers with a generic and cursory understanding of roles and responsibilities. While some guidelines (i.e., tenant/owner agreements) address interfaces between facility managers and tenants, not all have been approved or implemented, and consequently, in practice, the jurisdictional boundaries are not consistently implemented. For example, written agreements are in place or are being developed at the Chemistry and Metallurgy Research (CMR) facility to formalize and clarify working relationships, authorities, responsibilities, channels of communication, and expectations between the facility manager (i.e., owner) and the numerous tenants (i.e., users). These agreements are in the formative stage at TA-53, where multiple transient tenants are commonplace. Similarly, the clarity and specificity of agreements that delineate responsibilities, jurisdictional boundaries, and interfaces between deployed ES&H personnel and facility managers vary considerably. Facilities, Safeguards and Security (FSS) Division assessments currently being performed are expected to identify deficiencies in delineation of roles and responsibilities within facility management units and provide a path forward.

Successful implementation of the facility management model requires that interrelationships, interfaces, and jurisdictional boundaries be clearly defined and understood by all parties associated with all work being performed. The Type A accident investigation reports regarding the electrical incidents in January 1996 and July 1996 identified the lack of rigor in defining responsibilities, authorities, and interfaces between facility managers, ES&H organizations, support organizations, and line management as contributing causes.⁵

Project and Resource Management. LANL's funding is principally derived from programmatic needs—DP, EM, and the Headquarters Offices of Energy Research and Nuclear Energy. Funds to support LANL's infrastructure come from "taxes" levied on the numerous programs. The dramatic decrease in programmatic funds in recent years, especially weapons research, design, and testing, has been accompanied by a deterioration in LANL's infrastructure—e.g., some facilities have reached the end of their planned useful life and are strong candidates for life extension measures. Consequently, the gap between funds available from the "tax base" and the resources needed to maintain the infrastructure has grown, impacting LANL's ability to

Tenant/owner agreements and other initiatives are expected to clarify roles and responsibilities at the facility level.

The decrease in programmatic funds has affected the infrastructure and ES&H performance.

⁵Type A Accident Investigation Board Report on the January 17, 1996, Electrical Accident with Injury in Building 209, Technical Area 21, Los Alamos National Laboratory; and Type A Accident Investigation Board Report, July 11, 1996, Electric Shock at Technical Area 53, Building MPF-14, Los Alamos National Laboratory.

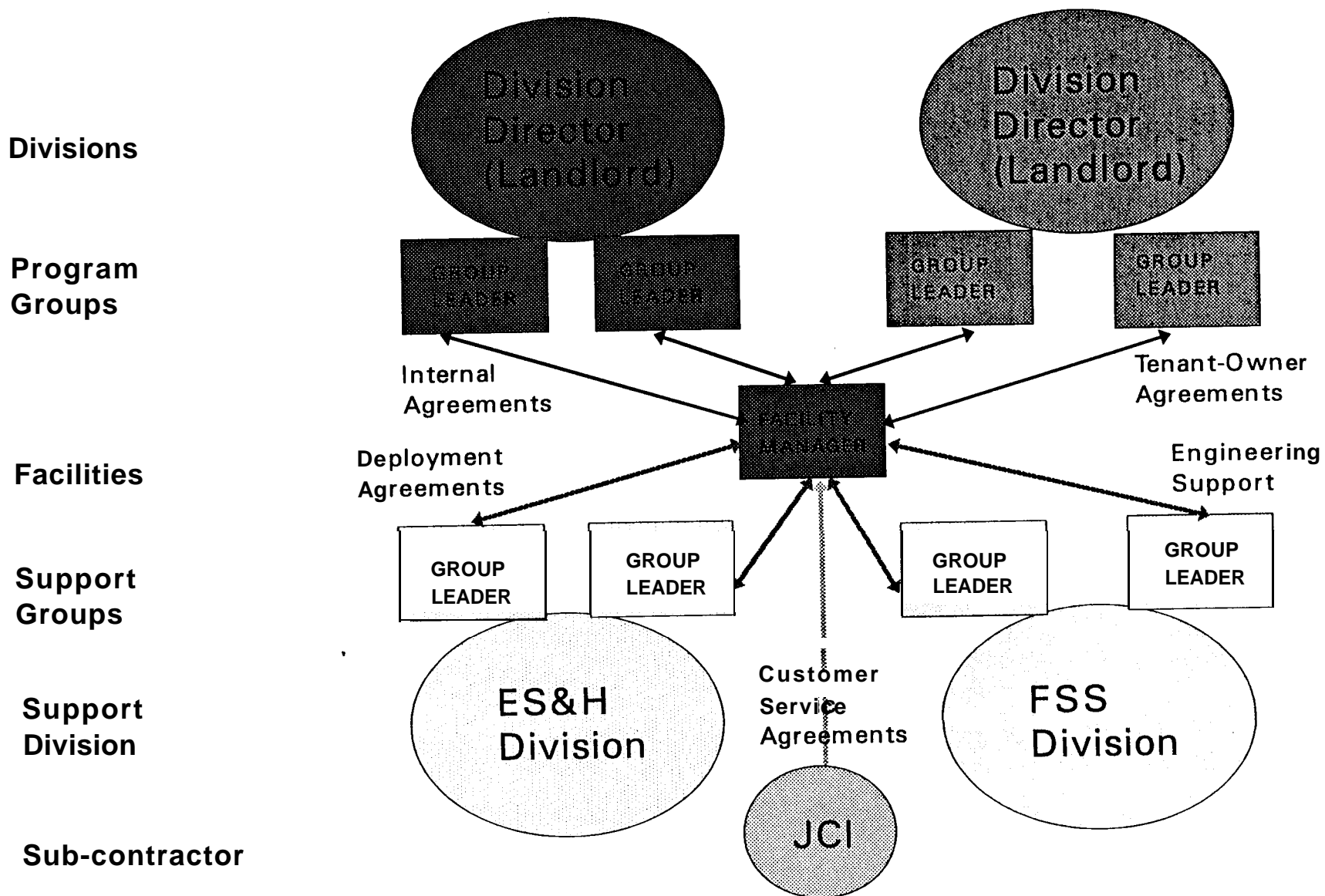


Figure 5. Relationships Among LANL Organizations

implement needed maintenance and work planning upgrades. It also emphasizes the importance of allocating ES&H resources in a manner commensurate with risk. Individual project and resource management systems are being used by DOE and LANL to allocate resources for ES&H. However, the process for synthesizing program objectives with ES&H requirements is not mature and is not effectively coordinated. Systems for rigorously evaluating and prioritizing ES&H programs are not being used by DOE and LANL uniformly across the site. Such formal prioritization techniques are applied to environmental management programs.

The limited use of integrated planning and scheduling techniques, coupled with inconsistent use of formal prioritization methods, inhibits managers' ability to deploy resources effectively. With the exception of TA-55, facilities do not use an integrated planning or budgeting process for determining the ES&H resources needed for facility operations and program activities. The ES&H resources assigned to each program are determined through negotiations between ESH and line management, without the benefit of rigorous analytical techniques; this approach impacts line management's ability to apply the principles of a graded approach to facility safety. ES&H allocations reduce the funding available for mission activities (e.g., research); accordingly, it is important to use formal and rigorous methods to ensure that the priority and adequacy of ES&H programs are appropriately considered.

The absence of an institutional work control standard creates barriers to ensuring that project management activities address hazard identification and associated mitigation techniques. Facility- and activity-specific projects reflect work control processes that are not uniform, often complex, and not always established with information from appropriate personnel. For example, JCI, a principal construction subcontractor, are not integrated into work planning, work improvement, or identification and control of occupational safety and health hazards. Consequently, some existing hazards and hazard mitigation practices are not accurately reflected and funded in project plans. LANL's FSS Division and JCI have initiated actions to improve work planning.

Neither DOE nor LANL has effective systems to manage sitewide ES&H information regarding ES&H performance and corrective actions necessary for management decision making and prioritization of projects and resources. The existing fragmented and informal information systems make it difficult to identify the extent of safety problems, or to determine where to apply ES&H resources, particularly when making decisions about the relative priorities at different facilities. Further, neither AL, LAAO, nor LANL systematically compiles and analyzes sitewide data, thereby contributing to delays in implementing corrective actions plans, new or modified policies, and resolution of issues. A number of limited-scope systems are being used, ranging from a system maintained by the LAAO Facility Representatives at TA-55 to a broader application within the Chemistry, Science and Technology Division (CST), where the corrective actions from formal quarterly inspections

Limited use of budgeting methods impacts the ability to apply a graded approach to facility safety.

Work control processes are not uniform and do not always reflect complete hazard information.

Funding has been allocated to improve management information systems.

spanning numerous facilities are tracked by the Chemistry Facilities Facility Manager. However, these systems do not readily support trend analyses. Funding for FY 1997 has been allocated to address development of an integrated management information system. This is further discussed under Guiding Principle #2.

Accountability for Performance. DP, EM, AL, and LAAO managers recognize that they are responsible and accountable for safety, although formal mechanisms for holding DOE organizational entities and individuals accountable have historically been weak. The appraisal process used to evaluate AL and LAAO personnel does not include objective measures of safety performance. DOE line managers are not being held accountable for developing a clear path forward that leads to the timely approval of safety analysis documents.

AL and LAAO management have not been effective in holding LANL accountable for correcting longstanding deficiencies, as previously cited in both DOE and UC reports subsequent to the January 1996 electrical accident. Recent initiatives by DOE to address LANL accountability in the renewed contract with UC by incorporating measures that are typical of other DOE contracts are encouraging, but are still in the development stage.

The ES&H criteria and metrics contained in Appendix F of the current UC contract have been improved, but do not yet provide AL and LAAO with the means to motivate LANL management to focus attention on identified problem areas or areas warranting improvement. For example, the predominant use of qualitative goals for industrial hygiene and industrial safety performance hinders management's ability to precisely monitor declining performance and take appropriate corrective actions. The system of rewards and penalties in the current UC contract does afford DOE some monetary leverage by impacting the salary bonus pool for LANL senior managers and the internal research and development funding. This ability has a limited financial value and associated impact. As a result of these weaknesses, DOE's ability to influence improvement in performance through contractual mechanisms has been limited. The LANL organization is partially motivated through other mechanisms, such as professionalism and moral suasion, which have been only partially effective.

JCI and the subcontractor for the guard force operate according to cost-plus-award-fee contracts, which provide LANL with a vehicle for holding them financially accountable for ES&H performance. LANL used this mechanism following the January 17, 1996, electrical accident at TA-21, and accordingly, the award fee for the applicable rating period was reduced. However, JCI received high scores in areas such as maintenance and work planning in rating periods up to, including, and after that event; the work planning and control deficiencies that led to the accident were not reflected in the award fee evaluation. The principal driving factor in the JCI award fee determination associated with work

Accountability for DOE managers is weak.

Recent contract initiatives to improve accountability are positive but are still in the formative stage.

Johnson Controls, Inc. (JCI) deficiencies were not considered in determining its award fee.

planning and control is schedule compliance (i.e., starting and finishing work on time).

In the environmental compliance arena, there is evidence that LANL is taking steps to improve organizational accountability for ES&H performance. For example, fines resulting from environmental violations have been charged against the responsible line organization.

LANL senior management is initiating actions to improve individual accountability; these include requiring all Laboratory and subcontractor personnel to sign a safe work pledge, developing the "accountability matrix," and establishing provisions for evaluating division managers.⁶ At TA-55, a number of specific radiological performance goals have been included in individuals' performance evaluation criteria, and the TA-55 management walkaround program includes metrics for selected managers. Further, various disciplinary actions, including time off without pay, are being used to emphasize individual accountability for safety.

Despite these positive initiatives, the current LANL systems for ensuring that managers and workers are accountable for effective ES&H performance are not sufficiently developed. Existing performance evaluations for LANL personnel contain ES&H criteria that are generally neither clear, specific, nor measurable. Further, mechanisms for defining individual accountabilities for ES&H—such as position descriptions, individual development plans, and performance evaluation criteria—are not clear. Similar weaknesses are evident for subcontractor employees.

Several recent initiatives by LANL designed to combat unsafe work practices and instill greater awareness of personal accountability for ES&H performance are being planned or are in their initial stages of implementation. While their effectiveness could not be determined during this evaluation, their existence is very encouraging. Included are the development of an awards and recognition program sponsored by the OWG to promote ES&H excellence sitewide; positive reinforcement actions (e.g., safety suggestion awards); a revised "Director's ES&H Scorecard" that incorporates performance on Appendix F measures, "Safety First!" tactical goals, and other factors into appraisals for division directors; and linking and aligning personal performance to organizational goals for all LANL employees for the 1996-1997 performance review period.

Although not universal, there is a perception among some workers that disciplinary actions for poor ES&H performance are being applied inconsistently across the Laboratory. Highly visible incidents requiring senior management involvement tend to result in sanctions commensurate with the level of infraction. In at least three recent instances, less-

LANL personnel performance evaluation criteria for ES&H are not sufficiently developed.

LANL is taking positive steps to instill greater awareness of ES&H responsibilities.

Disciplinary actions are not consistently applied.

⁶A system of rewards and sanctions applicable to individual LANL employees is currently in draft form. It is intended to motivate ES&H performance, awareness, and safe behavior and establish management guidelines for applying accountability measures.

visible events that also compromised safety—unauthorized work had been performed by LANL line program personnel—went undisciplined. Furthermore, some subcontractor and craft personnel have the perception that craft workers receive greater sanctions than LANL personnel under similar circumstances.

Overall Assessment of Guiding Principle #1. It is difficult to dismantle the barriers against acceptance of the need for heightened safety awareness and improving existing safety systems, especially in a predominantly research and development environment where application of requirements to ensure the quality and safety of operations is often viewed as hindering scientific research. Many LANL managers and workers are slow to accept and react to needed changes.

DP, AL, LAAO, and senior UC and LANL line managers have demonstrated their concern for and awareness of the need for improved safety performance at the site. The establishment of relevant policies, the formal declaration of related priorities (e.g., "Safety First!"), visible actions following recent serious accidents (e.g., the stand-down of all operations to address and reflect on safety, and the Employee Safety Commitment), and the design of a conceptual approach for ensuring safety performance (i.e., integrated safety management) emphasize the level of their understanding and degree of intent. With all of these positive developments, fundamental and vital components necessary to implement an effective safety management program require additional attention.

In general, site management is having difficulty achieving effective communication at all organizational levels. Good communication is especially important to implementation of the facility management model, where clarity of authorities, responsibilities, and interrelationships between facility management, program personnel, and ES&H professionals supporting line program organizations remains deficient.

Comprehensive sitewide management systems to promptly communicate important information on safety have not been established, undermining LANL's ability to impact ES&H performance by making necessary adjustments. Existing systems and initiatives to perform this function are fragmented and unsophisticated, while systems to capture facility availability performance are well established. LANL personnel readily understand the importance of good data—this is inherent in and essential to the research work performed at the site. This same understanding is not being applied to establish reliable and comprehensive management information systems.

While ongoing DOE and LANL initiatives to address accountability are encouraging (e.g., strengthening ES&H performance criteria in the DOE contract being renewed with UC, developing an "accountability matrix" for LANL personnel), current systems remain deficient in holding managers and workers answerable for safety performance. These deficiencies are exacerbated by weaknesses in the delineation and

Management actions to improve safety are visible and founded on a good understanding of needs.

Communications are important in implementing the facility management model.

Systems for maintaining accountability for safety performance remain deficient.

communication of authorities, roles, and responsibilities. The absence of meaningful performance evaluation criteria and systems to link monitored performance with responsibilities has seriously impacted organizational and individual accountability for ES&H performance.

ES&H risk prioritization techniques are not used consistently at LANL to ensure that resources are correctly aligned with known hazards at the site. Rigorous methods are used for funding and budgeting environmental management programs, where financial penalties can be imposed for violations. Such methods are not used for safety and health funding decisions, where there are no financial penalties for infractions. Compounding this situation is a lack of institutional systems to ensure that hazards and associated hazard mitigation techniques are identified and appropriately incorporated into project planning and work control.

Ensuring that systems exist to effectively address the multitude of issues and concerns associated with safety management at LANL is a significant challenge. The barriers to effective safety management at LANL are not insurmountable. Recent and ongoing positive initiatives will require a sustained and consistent commitment by management to establish the necessary infrastructure. Further, worker attitudes must be addressed using effective communication techniques that permeate all organizational levels. While the weaknesses and gaps identified in safety management at the site do not present any immediate threat to workers, the public, or the environment, they require prompt and focused management attention.

Guiding Principle #2 - Comprehensive requirements exist, are appropriate, and are executed.

Requirements Management. AL and LAAO have a key role in identifying applicable DOE and external (state, local, and other Federal agency) ES&H requirements and transmitting them to LANL for review, implementation, and formal inclusion in the contract. AL and LAAO have processes for ensuring that applicable DOE orders are transmitted to LANL and included in the contract. However, neither AL or LAAO has designated responsibilities for monitoring the development and completion of implementation plans for these requirements.

The contractual flowdown of ES&H requirements from LANL to subcontractors is another key element of a requirements management system. UC procurement procedures require a flowdown of requirements to subcontractors; however, there is no mechanism in place to ensure that subcontractors work to the same requirements as LANL, and language in the subcontracts is often vague.

The process used to identify external requirements for environmental compliance, environmental restoration, and waste management is effective. LAAO has an effective process for working with LANL to identify new and changed requirements using a variety of state and Federal sources and through direct contact with EH.

Continuing management attention, and effective communication with workers is needed to reap the benefits of recent positive actions.

AL and LAAO have processes for transmitting applicable Departmental orders to LANL.

There is no mechanism to ensure effective flowdown of requirements to subcontractors.

The process for identifying external requirements for environmental compliance is effective.

AL, LAAO, and LANL have not instituted an integrated sitewide requirements management system at LANL. Essentially all aspects of the LANL requirements management system have been in a state of flux for the past few years. During this continuing state of transition from one requirements management system to the next, the LANL documents that govern operations at LANL facilities are in various states of currency, and there is a significant amount of confusion regarding which requirements apply. In addition, there are numerous methods (including manuals, memoranda, procedures, and bulletins) by which requirements are communicated to line and ES&H managers and workers, and there are few controls on how the facility-specific information is updated, rescinded, and approved. The various LANL communications often contain overlapping and inconsistent requirements and processes, so it is difficult for the workforce to know which requirements apply at any given time, and which have been superseded.

LANL is in a state of transition, and there is confusion about which requirements apply.

The absence of an effective sitewide requirements management system at LANL impacts the success of many of the key initiatives. Two of the five steps for the "working safely" initiative in the DNFSB 95-2 implementation plan require analysis of hazards and identification of standards and requirements; confusion regarding which requirements apply to specific activities will hinder effectively completing these steps. In the integrated safety management model, sitewide safety standards and guidance are derived from DOE and non-DOE requirements, which in turn drive the facility-specific safety requirements (authorization basis, facility-specific procedures) and ultimately the activity-specific procedures. Facility managers must be aware of the applicable requirements, integrate requirements across projects and programs, and resolve problems arising from overlapping or conflicting requirements. However, there are currently no institutional systems in place to ensure a traceable flow of applicable requirements and related information from the institutional level to the facility and activity levels.

The lack of a sitewide requirements management system impacts many key initiatives.

LANL is using the "necessary and sufficient" process to implement the standards-based approach (i.e., "Work Smart"). However, LANL's current approach does not follow the guidelines provided in DOE "necessary and sufficient" policy and has not built the necessary infrastructure to validate effectiveness. While the "necessary and sufficient" base Radiation Protection Standard set was approved by AL and LAAO, further development of the "necessary and sufficient" process at LANL does not currently have the support and acceptance of AL and LAAO.

Hazards Analysis. LANL performs hazard analysis at three levels: facility authorization basis, facility health hazards assessments, and activity-specific hazards analysis. The status of hazards analysis varies considerably at all three levels.

LANL has made progress in their efforts to bring LANL hazard analysis for authorization bases (e.g., safety analysis reports and technical safety

requirements) into compliance with current requirements and DOE expectations. Safety analysis reports (SARs) are the major component of the development of hazard analyses for DOE nuclear facilities. Several of the LANL nuclear facilities have approved SARs that meet current DOE requirements. Facilities such as TA-18 have completed annual SAR updates. During the past year, LANL has applied significant resources toward developing the SARs for the remaining nuclear facilities.

A number of problems have been evident in the DOE SAR review and approval process (e.g., unclear expectations from DOE and lengthy and resource-intensive SAR reviews and comment resolutions). As a result, neither TA-55 nor CMR facilities have current and accurate SARs and technical safety requirements (TSRs) that comply with the current DOE orders and standards, which were issued in 1992. However, for TA-55 an updated final safety analysis report (FSAR) is nearing approval. While the FSAR includes more comprehensive process hazard analyses, there are deficiencies in the hazard analyses. To address these deficiencies, TA-55 plans to conduct more detailed process hazard analyses during the next four years (per commitments in the draft safety evaluation report).

In the absence of DOE-approved upgraded authorization bases, both TA-55 and CMR facilities are using their old safety documents to govern their operations. While worker safety is addressed through other activities such as PHAs, the outdated SARs do not address worker safety with the same degree of rigor as required by the current orders, and do not provide an adequate baseline for the unreviewed safety question determination (USQD) process. There are limitations in the USQD process being used at TA-55 and CMR to address hazard analyses including worker safety. Until the facilities have approved updated SARs and TSRs, the USQD process will continue to rely on administrative controls and professional judgment to ensure adequate protection of workers.

LANL health hazard assessments have now been completed for most LANL facilities. These have significant potential to identify, quantify, and rank the relative risk to workers resulting from exposure to physical, chemical and biological hazards within the facility (although the initial emphasis has been primarily on chemical hazards).

LANL also performs a large number of hazard analyses in support of work activities. Hazard analyses may consist of preliminary hazard analyses (PHAs), activity hazard analyses, task hazard analyses, or hazard analyses incorporated into safe operating procedures or special work permits.

There are no formal, consistent, sitewide control processes for hazard analyses; as a result, the quality of these hazard analyses varies and is often inadequate. Collectively, hazard analyses in support of work

A number of problems have been evident in the DOE review and approval process for safety analysis reports.

Outdated safety documents used to govern operations at some facilities do not provide an adequate baseline for unreviewed safety question determinations.

Health hazard assessments are now complete for most LANL facilities.

Many activity-specific hazard analyses are inadequate.

control are conflicting, confusing, occasionally incomplete, and based on outdated instructions and forms.

Management expectations and policies concerning hazard analyses are neither well defined nor effectively communicated. Activity hazard analyses and PHAs are frequently prepared without procedures by individuals with no hazard analysis training, and are not routinely reviewed by ES&H professionals. These shortcomings result in important and appropriate information not being included in the hazard analysis documentation. For example, critical information regarding hazards on energized electrical work permits has been found to be missing. Some of the missing information consisted of:

- Voltage levels
- Procedures
- Training certifications
- Unspecified lockout/tagouts
- Inadequate definition of work
- Specification of work location.

Some PHAs and activity hazard analyses were observed to present conflicting hazard information (e.g., identifying a common location as being both radiological and non-radiological, incorrectly identifying the hazard, or not addressing actions to quantify the hazard).

Implementation of Requirements. The LANL functional area programs reviewed on this Oversight evaluation vary in effectiveness. Of the 15 programs evaluated, four were judged to be effective: waste management, environmental restoration, decontamination and decommissioning, and criticality safety. Seven were determined to require improvement: radiological protection, construction safety, industrial safety/hygiene, occupational health/medical surveillance, process safety, engineering/configuration management, and surface water. Four were judged to have significant weaknesses: work planning and control, conduct of operations, maintenance, and electrical safety.

Three of the effective programs were in the general area of environmental management, some aspects of which are covered by environmental compliance regulations. These violations are subject to fines, civil penalties, and/or criminal prosecution.

Program elements and procedures that are vital to effective implementation of ES&H requirements are missing or inadequate. For example, maintenance and construction work is often performed without detailed work definition or instructions. Work planning and control procedures do not capture revisions in work scope; as a result, scope changes are not subject to appropriate hazard analyses and approval. Important elements of conduct of operations are not captured in program documentation or procedures, such as operator response to abnormal or emergency conditions. Further, despite two recent serious electrical accidents involving serious injury to personnel and several other near

Environmental programs covered by external regulations are effective.

A number of programs are missing important elements.

miss electrical events, there is no formal sitewide electrical safety program and implementing procedures.

Even for those requirements that have been clearly identified in procedures, implementation deficiencies are evident at many facilities. Procedure adherence and work discipline are weak. Many of the recent accidents and near misses involved people that disregarded procedural steps or violated specified provisions.

In general, LANL does not have effective controls and methods to ensure that ES&H requirements are accurately reflected in procedures and effectively implemented. Some of the common trends that were evident during this evaluation and that contribute to weaknesses in implementing requirements include:

- At the institutional level, there is a lack of sitewide controls to ensure that programs are adequately implemented across the site.
- At the facility level, organizational structure and interfaces are not well defined and do not adequately support effective implementation of programs (e.g., conduct of operations and configuration management).
- At the activity level, work planning and control processes are not effectively implemented.

In addition, a number of factors discussed elsewhere in this report contribute to deficiencies in implementation (e.g., no comprehensive requirements management system, poorly defined roles and responsibilities, deficient accountability systems, delays in SARs causing delay in procedure development, and assessment programs that are not finding and correcting deficiencies).

Although there are systemic problems with the use of procedures across the site, LANL has made improvements in many portions of their operations, and there are pockets of the site that display effective performance. For example, operations associated with the Actinide Source Term Waste Test program (STTP) in CMR are well documented and carried out according to test plans. Similarly, the conduct of operations program related to TA-53 accelerator operations is well documented and implemented.

Ongoing LANL initiatives, such as the facility management model, "safe work practices," and "accountability and awareness," are intended to address identified concerns. While promising, these initiatives are not sufficiently mature to make major improvements in requirements implementation on a sitewide basis. Localized improvement is evident in areas where there has been sustained attention, such as TA-55. The "safe work practices" initiative is expected to provide the guidelines and methodologies at the activity level for the work planning and control. However, this initiative has a broad scope and long schedule (two to

Implementation of requirements is deficient at institutional, facility, and activity levels.

LANL has instituted initiatives to address many areas of concerns.

three years) and thus will not have a significant near-term impact on the current inadequacies in work planning and control. Further, the safe work practices initiative requires input from the Laboratory standards project for higher-tier documents, and that project is currently under review and may not continue as planned.

Assessment Programs. AL, LAAO, and LANL have a wide variety of formal and informal programs to monitor, review, and evaluate ES&H performance. These programs are operating at various levels of effectiveness.

Consistent with the pilot oversight program for line ES&H management, DP does not perform separate assessments of LANL operations. DP relies upon, and in some cases, participates in, the AL appraisal process.

The most important AL assessment (the annual pilot appraisal for ES&H) and the performance assessment matrix (PAM), which is AL's overall evaluation and rating of LANL ES&H performance, are predicated on the effectiveness of the LANL self-assessment program, the adequacy of the performance criteria in the LANL contract, and the effectiveness of LAAO in monitoring LANL. All three of these elements require improvement as discussed below.

The AL annual ES&H appraisal is the only scheduled assessment activity carried out by the DOE line programs at the operations office or Headquarters level. Additional reviews can be conducted "for cause."

Based on the results of the pilot appraisal and other assessment activities, AL developed a draft ES&H PAM for LANL in 1996. The information used in the development of the PAM includes results of self-assessments, external reviews (including regulatory inspections, DNFSB reviews, and DOE vulnerability reviews), the Occurrence Reporting and Processing Systems (ORPS), ES&H Management Plan, functional area appraisals, and similar data. The matrix rates a set of functional areas for risk and performance. The PAM is a sound concept, but is limited by the data considered, which in some cases are not useful or complete.

In addition to the AL ES&H appraisal and PAM, LAAO reviews LANL ES&H performance through the Facility Representative program and surveillance of various technical programs. The Facility Representative program is functioning adequately in terms of identifying ES&H deficiencies and bringing them to the attention of the responsible LANL manager and has positively impacted LANL performance in some areas. However, Facility Representative program effectiveness is diminished by several factors. The Facility Representative coverage is spread thin, considering the complexity and size of the LANL complex. Also, the processes used by Facility Representatives do not consistently result in timely improvement in LANL operations. All Facility Representative activities are recorded in their logbooks, and issues are initially presented to LANL verbally. In some cases, issues brought to the facility managers' attention are not resolved in a timely manner.

AL performs an annual ES&H appraisal. LAAO performs other assessments of LANL operations.

The performance assessment matrix developed by AL is a sound concept.

The Facility Representative program is functioning adequately.

Mechanisms exist to escalate and resolve such issues more formally; followup is dependent on the perseverance of the individual Facility Representative. Quarterly reports prepared by Facility Representatives summarize findings but do not include all of the verbally transmitted issues. Finally, findings are not trended and evaluated to determine underlying systemic problems.

Neither AL nor LAAO has a self-assessment program to evaluate its own performance in overseeing LANL ES&H management. AL does have a strategic plan that forms the basis for its self-evaluation, but this effort is oriented more toward mission accomplishment than toward ES&H performance. LAAO conducts an evaluation of its performance against the LAAO operational plan, which is linked to the AL Strategic Plan.

AL and LAAO do not have self-assessment programs, but evaluate their performance against strategic and operational plans.

LANL assessment activities range from contractually-required UC Self-Assessment and Annual Review Process—a formal self-assessment of each functional area by responsible laboratory line management that is reported to UC and formally used to evaluate LANL performance against the objective standards of performance specified in the contract—to informal management walkarounds. One of these is the independent internal assessments program, which conducts performance-based, formally documented assessments covering functional areas such as radiation protection program or hoisting and rigging, in response to requests by line managers. Other important elements are occurrence investigations, annual criticality safety assessments, occupational safety and health inspections, and the "management by walking around" program, in which line management walks the work spaces to observe operations.

LANL assessment activities vary in scope, level, rigor, and formality.

These programs vary significantly in scope, level, rigor, and formality, and have different approaches to reporting and recording results. For example, criticality safety assessments are conducted regularly and result in a formal report, while construction safety assessments of construction projects are informal and do not result in any information that can be tracked and trended. In addition, the line management activities, such as the management walkarounds, vary in effectiveness as described below.

LANL independent internal assessments conducted by the Audits and Assessment Office (AA) are generally effective in identifying deficiencies in the facilities and functional areas they review, and providing information to the manager who is directly responsible for the operation. Assessments to date have been conducted to address regulatory requirements and requests from line management; other important aspects of the safety management program had not been reviewed for considerable periods. For example, some important functions, such as work planning and hazard analysis processes, have not been evaluated by LANL. To correct this problem, LANL has developed a risk-based prioritization approach (using the AL ranking model) for selecting facilities and functional areas for assessments. FY 1997 assessments will use this approach. The internal assessment group plans to augment

LANL internal assessments are generally effective and will be improved by adopting risk-based selection.

its staff by acquiring technical specialists from other organizations to do future assessments.

A variety of corrective action management systems are in place at both AL/LAAO and LANL. There are a number of aspects of the currently existing corrective action management systems that limit their ability to provide line management with the type of information needed to prioritize and implement corrective actions. For example, management of AL and LAAO identified deficiencies is accomplished through the AL system (AIMS) and through tracking by individual LAAO Facility Representatives. The AIMS system is not fully functional at this time, and the Facility Representatives' tracking systems are not integrated with one another or with AIMS.

The LANL corrective action system is fragmented across many groups on site. Corrective actions reported in ORPS or resulting from accident investigations are split between the Environmental Safety and Health Group (ESH-7) and AA. ESH-7 has responsibility for occurrence reporting and all corrective actions related to the ORPS. AA-1 has responsibility for all corrective actions resulting from internal or external assessments. For serious accidents, requiring a Type A or B investigations, ESH-7 and AA-1 track different aspects of the event. For both groups, the corrective action systems lack risk-based prioritization, threshold trending, escalation of overdue actions for resolution, and routine reports to senior management. An exception is that LANL recently performed a risk-based prioritization of the outstanding Tiger Team action items; many of those items have since been closed. Other corrective actions (e.g., deficiencies, issues, procedure and safety violations, and equipment failures identified through other LANL processes) are not coordinated across facilities and organizations. Numerous safety infractions, procedural violations, and issues below the reportability threshold are not collectively tracked, trended, or reported to upper management. These limitations impact the ability of senior managers to have a clear understanding of ES&H performance, progress against correcting key deficiencies, and trends that may identify systemic issues and that may be precursors to more serious events.

LANL has not established an integrated lessons-learned program and there are no procedures for lessons learned activities. Some elements of a lessons-learned program exist. ESH-7 disseminates lessons learned information for some issues in several different forms such as one page safety bulletins, periodic briefings to facilities, and through e-mail. There are no sitewide procedures to ensure information flow-down to appropriate audiences. For example, relevant event reports are not included as required reading for TA-55 operators. Deficiencies are identified and tracked within individual divisions and groups and generally are not included in any sitewide lessons-learned programs. Initiatives are under way to develop a sitewide corrective actions information system; a pilot is being planned for FY 1997.

Corrective action management is distributed among many organizations.

There is no sitewide lessons-learned program.

On balance, assessment programs at LANL, LAAO, and ALO are implemented and have some positive aspects, but are not linked at the various levels to provide a comprehensive picture of LANL performance. The existing corrective action management systems are not effective and are not providing managers with information critical to program improvement. Initiatives planned in these areas will help correct the deficiencies.

Overall Assessment of Guiding Principle #2. Safe operations require a comprehensive system in which policies, requirements and standards are clearly identified; the scope of work is well defined and the associated hazards are analyzed; effective mitigative measures and hazard controls are identified through a systematic process; requirements and hazard controls are clearly communicated to the workforce through procedures that workers understand and follow; and systems that are in place to measure effectiveness and provide feedback when the hazard controls are not effective or are not followed. LANL displays weaknesses in each element of the system, and the individual elements are not coordinated or mutually supportive.

A number of factors contribute to these weaknesses. There is no sitewide process to effect flowdown of requirements to the working level. Often, the people at the working level, from researchers to crafts workers, have not been told what requirements apply to them, and how they should implement them. In some cases, procedures are not available; in other cases, procedures are ambiguous, conflicting, or do not correctly reflect requirements.

Implementation deficiencies are evident even when requirements have been clearly identified in procedures. The four recent serious accidents involved people who disregarded procedural steps or violated specified provisions; in some cases, a number of layers of individuals did not implement specified requirements for the task. Procedure adherence and work discipline generally are weak at LANL.

LANL has recognized that the current systems need improvement. Three of the five institutional priorities as defined by the OWG are directly related to this principle: standards, authorization basis, and safe work practices. The other two, facility management and accountability, are closely related. As discussed under Guiding Principles #1 and #3, better definition of responsibilities, meaningful accountability, and training are also essential to improving performance.

The identified LANL initiatives are conceptually sound and provide the foundation for an effective system; however they are generally in the formative stages, and are only beginning to have an impact. In some cases, such as the work planning initiatives, the positive impact will not be felt for some time. Successful implementation of the initiatives, weaknesses in assessment programs, and feedback mechanisms must be addressed by DP, AL, LAAO, and LANL in order to effectively determine the status and measure progress toward ES&H goals.

The systems to measure performance and provide feedback are not effective.

LANL has recognized the need for improvements and has instituted initiatives.

Efforts to correct weaknesses are promising, but are just beginning.

Guiding Principle #3 - Competence is commensurate with responsibilities.

Staffing and Qualifications. DP and, with some exceptions, AL have sufficient numbers of staff with appropriate qualifications in the ES&H disciplines (e.g., radiation protection) to perform their safety management functions. The few exceptions at AL relate to insufficient staff with "practitioner-level" experience in disciplines required to review and approve safety analysis reports and other authorization basis documentation and an appropriate level of experience and background in systems engineering and integration. These disciplines are becoming increasingly important as the AL Office of Technology Management and Operations (OTMO) continues to expand its role as a technical support organization. Moreover, staff with systems engineering and integration experience are needed for implementation of DNFSB Recommendation 95-2 and to develop an effective system to prioritize activities and optimize the available AL ES&H resources to support the AL and Area Offices.

Consistent with its increased scope of responsibilities, LAAO has increased its ES&H staffing from 14 to 42 in the past six years. Correspondingly, LAAO has strengthened its qualifications in ES&H disciplines. Additional attention is needed to address skill mix issues and shortages of qualified personnel in some technical disciplines, most notably radiation protection, industrial safety, and construction safety. LAAO management is aware of these weaknesses and has begun to address them through several initiatives.

To move toward implementation of the facility management model, LANL has re-engineered its ES&H organization. Currently, a large number of the ES&H staff have been assigned to line divisions responsible for research and development and decontamination and decommissioning. This deployment of ES&H staff to the field is a positive step and has been successful in terms of providing more direct support to line managers and in improving efficiency by streamlining interfaces. Continued attention is needed to formalize the deployment agreements and ensure remaining centralized functions supporting institutional objectives are adequately staffed.

Overall, qualifications for LANL ES&H professionals and JCI craft workers are adequate; however, one of the greatest challenges facing any decentralized management system, and especially one as diverse as LANL, is to ensure that the large number of non-ES&H personnel who have safety-significant responsibilities have appropriate levels of qualifications. A number of weaknesses were observed in the staffing levels and qualifications within this group. Most notably, LANL facility managers, group and team leaders, and JCI zone managers and supervisors lack experience with effective work planning and control programs. For example, few have attended training provided on the maintenance implementation process. Weaknesses in effective work

DP and AL generally have sufficient staff with appropriate qualifications.

LAAO has increased its ES&H staffing in the past six years.

Field deployment of ES&H staff is a positive step.

Overall ES&H and craft qualifications are adequate.

planning and control processes have contributed to several safety incidents at LANL.

Technical Competence and Knowledge of Hazards. AL and LAAO senior managers have a good understanding of the technical competence required to provide for safe operations of LANL. The ES&H elements within these organizations, including Facility Representatives, exhibit an appropriate level of competence and a good understanding of hazards associated with operations. The program for satisfying the requirements of the implementation plan for the provisions of DNFSB 93-3 is administratively established and is effectively managed by AL, although progress on some aspects of the program—especially as it relates to LAAO—has been slow.

The LAAO Facility Representative qualification and training program has been developed and meets the qualification standard requirements defined by DOE's DNFSB 93-3 implementation plan and DOE orders. The basis of an appropriate program is established, with five of the nine LAAO Facility Representatives having completed all their qualification requirements. The Facility Representative program has improved as a result of increased LAAO senior management attention; continued management emphasis will ensure that the qualification process for the other four Facility Representatives is completed expeditiously. Considering the complexity and diversity of LANL operations, along with LAAO's intention to provide oversight of the entire scope of Laboratory activities, the staffing levels and resources assigned to the Facility Representative program need enhancement. In addition, tools and capabilities are needed to understand the systemic causes of isolated deficiencies observed during daily activities.

LANL and subcontractor personnel involved in implementing the safety management program generally exhibit an acceptable level of competence. The LANL ES&H managers have strong technical credentials and experience required for their positions. ES&H technical professional and training staff have necessary skills, knowledge, and essentially all have advanced degrees in a broad spectrum of safety disciplines, physical and life sciences, and engineering; with few exceptions, technicians demonstrate a good level of experience and competence in their field.

Ensuring safety relies on the competence and knowledge of hazards of a spectrum of employees, such as maintenance personnel, operators, and engineers in addition to ES&H professionals. Overall, the level of competence of these personnel and their knowledge of hazards are adequate. Some groups are highly competent. Accelerator operators at TA-53 are competent and extremely knowledgeable of their systems and equipment, and JCI workers interviewed were knowledgeable of hazards associated with their craft as well as industrial hygiene and industrial safety hazards.

The program for implementing Defense Nuclear Facilities Safety Board Recommendation 93-3 is established and effectively managed.

Staffing and resources for the Facility Representatives need enhancement.

Safety-related LANL and subcontractor personnel exhibit adequate competence.

Worker Participation and Empowerment. AL and LAAO have functioning employee concerns programs. However, procedures are informal, and LAAO has no formal tracking system.

At LANL, mechanisms exist for registering ES&H concerns and for participating in work planning. There are also policies and procedures in place for recognizing employees who exhibit effective safety management performance, ensuring that employees have stop work authority if they believe there is a safety concern, and protecting workers from retaliation if they raise safety issues.

LANL has a whistleblowers policy, and the Director has recently restated the Laboratory's policy against reprisals for reporting employee concerns or complaints. LANL also has several programs by which workers can raise issues (an employee hotline, an ombudsman program for mediating disputes between workers and supervisors, and an employee advisory committee). These activities are not coordinated in the form of an integrated ES&H employee concerns program, and roles, responsibilities, and interfaces of these several related activities are not well defined. The lack of coordination among these programs may translate into employee uncertainty regarding utilization of the program and diminishes LANL's ability to conduct meaningful lessons learned or trending analysis.

JCI personnel are aware of avenues available to raise safety issues through the DOE and LANL employee concerns programs, but there is evidence of a reluctance to do so because of a perception of less than effective remedial actions in response to previous safety issues. Several JCI personnel interviewed indicated a preferential treatment of UC and other subcontractor staff in the administration of disciplinary action as a result of safety infractions or violations; this may also contribute to the reluctance of workers to raise safety issues.

AL, LAAO, LANL, and JCI have all stated that personnel have the right and the responsibility to stop work if a situation that has the potential for imminent danger exists. Personnel interviewed indicated that they feel empowered to implement stop-work authority, but the protocols for implementing stop work authority do not appear to be uniformly understood by the work force. This can lead to worker uncertainty and reluctance to apply stop-work authority.

Development of Laboratory-wide guidance regarding establishment of employee-based safety committees is an essential step to foster employee participation. With the advent of the facility management model, safety committees at LANL where they exist—are in transition from being division-based to becoming facility-based, and from being management-controlled to becoming employee-sponsored. In some facilities (e.g., TA-55, TA-53), this transition has been successful, and effective safety committees exhibiting strong worker involvement are in place. Across the Laboratory, however, the transition is slow and is hampered by the lack of overall guidance.

LANL has mechanisms for registering ES&H concerns.

The lack of a coordinated employee concerns program may promote uncertainty regarding utilization.

Laboratory-wide guidance on establishing employee-based safety committees is essential.

There are a number of awards programs that recognize effective safety practices and localized examples of activities instituted to recognize, and, thereby, provide a model for, positive worker contributions to environment, safety, and health. At TA-21, the Building 3/4 North Decontamination and Decommissioning Plan includes a mechanism for rewarding excellent worker performance.

Training. The AL Qualification and Training Division provides training support to AL staff, manages implementation of DNFSB 93-3 for the entire AL population, and provides technical support to LAAO staff, and conducts assessments of contractor programs. This division has recently been strengthened to better support these objectives. AL assessment of Laboratory training activities is effective and occurs through a variety of mechanisms, including ES&H integrated appraisals and operational readiness reviews. At LAAO, identification of training requirements for Federal staff and activities related to implementation of DNFSB 93-3 are distributed among the three Assistant Area Managers. Training requirements are documented in individual development plans as part of the technical qualification program.

The LANL ES&H training program consists of institutional, facility-specific, and job-specific training. Institutional and facility-specific training activities are mature and generally performance-based. Systematic approaches to training are used in definition of training program content and in design and development activities. Managers and instructors have necessary skills, education, and knowledge to provide effective institutional and facility-specific training. However, some weaknesses are evident in the delivery of institutional and facility-specific training. For example, group leaders, team leaders, and facility managers have been assigned a critical role in ensuring facility-specific and job-specific training of their employees; however, many of these managers have not received the necessary training that would assist them in executing this responsibility. In addition, formal qualification and training programs have not been developed for some ES&H functions including construction safety inspectors, industrial safety and industrial hygiene technicians, and engineering personnel at CMR and at TA-55 (although the Laboratory has committed to develop these programs).

A facility manager training program is being developed at LANL. However, the current resource commitment is not sufficient to implement the program on the proposed schedule.

At LANL, there are elements of a systematic on-the-job training program, including Laboratory standards, manuals, and protocols. However, implementation of on-the-job training suffers from differing interpretation of requirements and/or uneven attention by line managers. As a result, the effectiveness of on-the-job training is inconsistent and, at times, the training does not contain all elements important to the job, relies excessively on a read-only approach to understanding procedures, is not provided or is not documented, or does not reflect actual or unique site conditions. Specific evidence of these weaknesses at the facility level include: at CMR and at TA-55, engineering personnel do not have formal training in root cause analysis and corrective actions; systems engineers at CMR and at TA-55 do not have training on their facility authorization basis; and at TA-55, USQD pre-screens are being performed and approved by personnel who are not trained in the USQD process.

JCI has recently initiated activities to strengthen its training program, including establishing an on-the-job training program. At this time, JCI has not defined minimum training qualifications standards for craftsmen, foremen, supervisors, and management-level personnel. Without these standards, it is difficult to verify that the training provided through unions, JCI, and LANL adequately addresses specific job requirements. Lack of these standards may have contributed to observations of local deficiencies, such as construction workers who have not received adequate training in Occupational Safety and Health Act requirements (e.g., fall protection, lockout/tagout, and personal protective equipment).

Institutional and facility-specific training is well established and performance-based.

On-the-job training at LANL is not uniformly effective.

JCI is strengthening its training program.

Non-resident subcontractors are not adequately trained on safety expectations, policies, and procedures. For example, J&S electricians working at CMR were unfamiliar with the DOE and LANL safety expectations and were involved in numerous safety infractions at the commencement of work activities.

Overall Assessment of Guiding Principle #3. An area of strength is the overall competence of the DOE, LANL, and subcontractor workforce. Specifically, LANL's ES&H workforce exhibits a good level of technical capability and competence in essentially all ES&H disciplines. Recent deployment of ES&H personnel is a positive step for streamlining the staffing process and for providing direct support to the line managers. LANL needs to ensure that the staffing levels and competency of core functions supporting institutional objectives are sustained.

AL has sufficient technical personnel; the application of those personnel in providing technical support of LAAO needs to be improved. Except for Facility Representatives and technical specialists in radiological protection, industrial safety, and construction safety, LAAO has sufficient numbers of qualified technical resources to perform their primary ES&H function—day-to-day monitoring and assessment of LANL. The qualifications of LANL's non-ES&H personnel (with significant safety responsibilities) require improvement. Most notably, facility managers and group leaders responsible for conduct of programs and R&D require enhanced experience and training to recognize deficiencies in their individual work planning and control programs.

LANL has a number of employee concerns programs that are not well coordinated leading to employee uncertainty regarding utilization. Furthermore, effective mechanisms for obtaining meaningful worker input, including more focused safety committees, are needed. Two LANL efforts to strengthen the effectiveness of staff, on-the-job training and facility manager training, are particularly relevant and important to improving safety. Implementation and conduct of on-the-job training are inconsistent and require improvement; facility manager training—a new initiative—requires additional resources and needs to be accelerated to prepare facility managers with needed skills on a timely basis.

Ratings

The ratings for the twelve criteria, three principles, and overall LANL safety management program are shown in Figure 6.

The overall competence of the workforce is a strength.

The experience and training of facility managers and group leaders in work planning and control require enhancement.

Summary Ratings

Effective Performance

Improvement Needed

Significant Weakness

LANL*

Safety Management Program

Line Management Responsibility for Safety

Comprehensive Requirements in Place

Competence Commensurate with Responsibilities

Policy & Goals

Responsibilities & Authorities

Project/Resource Management

Stability

Requirements Management

Hazards Analysis

Requirements Implementation

Assessment Programs

Staff Qualifications

Competence & Knowledge

Worker Participation

Training

Criteria

*These ratings reflect the evaluation of safety management for the DOE and contractor line organization: DP, AL, LAAO, and UC/LANL

Figure 6. Summary Ratings for LANL

3.0 OPPORTUNITIES FOR IMPROVEMENT

The safety management evaluation conducted by EH identified several opportunities for improvement in safety management, based on an analysis of the strengths and weaknesses identified during the evaluation of LANL. These are summarized in Table 2. Opportunities for improvement, which are not prescriptive, may contribute to the success of the integrated safety management program.

1. **Enhance communications, coordination, and cooperation among DP, AL, LAAO, and contractor management by identifying inconsistencies and redundancies and clarifying roles, responsibilities, interfaces, and lines of authority.**

Background

Integrated safety management is most successfully implemented when all individuals within involved organizations understand clearly what is expected of them and what support they can reliably anticipate from others. Communication of such expectations throughout the management chains for LANL has not always been comprehensive, consistent, or formally documented. Poor communication has led to lack of clarity on roles, responsibilities, and authorities, which in turn has resulted in some observed weaknesses in effectively addressing the root causes of accidents and operational events and unnecessary delays in safety improvements.

Potential Actions

- DP and AL could collectively evaluate the existing or changing roles, responsibilities, interfaces, and lines of authority within DP, AL and LAAO, intended to provide operational and program directions to the contractors. Roles and responsibilities should reflect a shared ownership of the goals and should result in consistent and timely direction to contractor organizations. Roles, responsibilities, and authorities should be clearly articulated, documented, and communicated throughout the DOE organizations and the contractors.
- AL, LAAO, and LANL should reevaluate the existing roles, responsibilities, interfaces, and lines of authority of site line organizations, including subcontractors at LANL, to identify and correct inconsistencies and ambiguities. Further, ensure that clearly defined roles, responsibilities, and authorities are an integral part of initial planning for new safety management initiatives.

Table 2. Opportunities for Improvement

LANL - DP, AL, LAAO, and Contractors	
1.	Enhance communication, coordination, and cooperation among DP, AL, Area Offices, and contractors: <ul style="list-style-type: none">• Identify inconsistencies and redundancy.• Clarify roles, responsibilities, interfaces.
2.	Identify approaches for timely and effective implementation of safety management initiatives.
3.	Increase organizational and individual accountability in DOE and contractor organizations.
4.	Develop management systems to provide continuous and accurate information on ES&H performance for managers.
5.	Take proactive control of changing culture towards procedure adherence and use.
6.	Implement effective interim measures pending full implementation of initiatives in <ul style="list-style-type: none">• Requirements• Work planning and control• Electrical safety.

- Reevaluate ES&H work processes, such as the review and approval of safety documents, to assure effective capture of defined roles, responsibilities, and authorities for each line organization.
2. **Identify approaches that senior line management could adopt to ensure timely and effective implementation of LANL safety management initiatives by developing detailed implementation strategies leading to increased management involvement and visibility, and clarifying interfaces and interrelationships among many initiatives.**

Background

LANL has many ES&H initiatives in various stages of development and implementation. Efficient and effective management of these initiatives is essential in addressing interim or compensatory measures of safety, in timely completion and integration of resulting programs, and in ensuring that responsible personnel are involved and take ownership of the end product. Several weaknesses were observed in this area: implementation milestones are often extended, resulting in customers' development and pursuit of

alternate processes and controls; focus is lost as new personnel get involved; new events and concepts detract attention; and the final product is no longer universally accepted and applied as "the site's approach" for implementing integrated safety management.

Potential Actions

DOE

- Include metrics for completing milestones for major improvement initiatives in Appendix F of the LANL contract.
- Monitoring and assessment activities for LANL should be directed toward assuring effective implementation of initiatives.
- Assign corresponding DOE champions for each of the LANL Tactical Plan areas to increase DOE support, coordination, and feedback.

LANL

- Evaluate the current management structure with regard to adequate assignment of responsibility and authority for safe laboratory operations and implementation of the OWG initiatives and recommendations.
- Evaluate the current decision making process with regard to effectiveness in evaluating issues and development of a path forward for resolution.
- Develop more detailed implementation strategies for the integrated safety management system and its component pieces and clearly identify steps, responsible organizations, and schedules for each initiative and how those initiatives are integrated. Further, define and clarify roles and responsibilities, interfaces, and lines of authorities among activity, facility, and institutional-level processes.
- Identify short-term goals and objectives for improvement in overall safety management and safety performance.
- Consider focusing LANL assessment activities on monitoring and evaluating the adequacy of implementation of major initiatives to provide timely feedback to management.
- Increase the direct communication of safety policies, programs, and procedures to affected site personnel through such methods as safety meetings for site personnel at all levels.
- Expedite implementation of the management walk-around program to include all major facilities and activities.

3. Increase organizational and individual accountability for ES&H performance within DOE and contractor organizations.

Background

The performance appraisal process used for ES&H does not effectively establish individual accountability for AL and LAAO personnel. Several ongoing initiatives address personal accountability issues at LANL. These include an accountability matrix, changes to expand the managerial performance measures in the DOE/UC contract, and awards and recognition systems. LANL is also reviewing the accountability mechanisms for subcontractors. Organizational accountability is not fully addressed by these initiatives, and LANL is not being held accountable for the ES&H performance of all personnel doing work at the Laboratory.

Potential Actions

DOE

- Modify or supplement existing personnel performance measures to clearly tie them to improving safety performance and implementing safety initiatives.
- Consider developing subordinate annual plans within the LAAO organizations that establish work tasks in support of their Annual Operation Plans.
- Evaluate the scope of LANL contract Appendix F criteria, with consideration of expanding the scope to include the subcontract workforce at LANL.
- Evaluate provisions used in other DOE contracts, including those with for-profit corporations, for provisions that will enhance incentives for improving safety performance.

LANL

- Reevaluate the effectiveness of methods for evaluating subcontractor performance. Include methods for developing metrics, assessing performance, and assigning award fees.
- Evaluate the use of disciplinary measures for consistency and assure that perceptions of a dual standard between UC and subcontractor employees are addressed.

4. Develop and implement management systems that provide continuous and accurate information on ES&H performance and that assist management and staff in assessing the effectiveness of the safety management program and in making decisions about resolution of ES&H issues.

Background

Effective management of ES&H issues requires that line management at all levels has readily available, appropriate, and usable information regarding the overall level of performance and the status of corrective actions addressing those issues. Reliance on periodic performance metric reporting will not provide adequate information for managers to make informed decisions regarding ES&H. Line managers responsible for ES&H at LANL from subcontractors through DP, do not have easy access to the additional information needed to make timely and informed decisions for resolving issues that are adversely affecting safety performance. Available information from such sources as assessments and events and resulting corrective actions is fragmented, often informal, and is not in a form that can be analyzed to identify and prioritize known deficiencies and issues and help management drive resource allocation and the development and monitoring of effective solutions.

Potential Actions

- Reexamine the management information systems and decision making process to establish the proper balance between collaboration/consensus and the operational control needs of a complex organization with significant safety challenges.
- Evaluate, strengthen, and integrate the various AL, LAAO, and contractor assessment programs and processes (e.g., management assessments, quality assurance audits and surveillances, self-assessments, and DOE surveillances and assessments) into a comprehensive program that ensures appropriate and timely evaluation of all organizations, facilities, management systems, and functional areas.
 - Strengthen and institutionalize the contractor self-assessment process through a rigorous, *programmatic* approach within organizations at all levels.
 - Improve area office surveillance processes for both Facility Representatives and technical representatives (subject matter experts) by increasing the time spent in facilities, improving the formality and structure of the technical representative program, enhancing root cause analysis skills, and improving timeliness and thoroughness of documentation.
- Establish integrated corrective action management programs for LANL to ensure that ES&H deficiencies are documented, prioritized based on risk, assigned to managers with authority for corrective action, evaluated for extent of condition and root

causes, corrected, and tracked to closure. These programs should:

- Capture findings from all internal and external assessment activities, events, employee concerns, accidents and near misses.
- Collect deficiencies and corrective actions for tracking, analysis, trending, and reporting to line managers. Include identification of action due dates, responsible managers and organizations, and processes for escalating overdue corrective actions to appropriate levels of management, and assuring documentation of resolution and closure.
- Involve a sitewide prioritization process for addressing identified deficiencies, findings, and issues to assure adequate consideration of risks to the public, workers, and the environment.
- Analyze identified items for adverse trends, lessons learned, and systemic issues and communicate findings to the appropriate levels of management.
- Provide for DOE and contractor management and quality assurance oversight and followup of corrective actions to provide continuous periodic verification of the effectiveness of the corrective action program.

5. LANL senior management should take proactive control of changing the Laboratory culture towards procedural adherence and use.

Background

The investigations of recent accidents and events at LANL and many of the weaknesses identified by Oversight at the Laboratory reflect the failure to use or adhere to instructions and procedures as a contributing or root cause. The ingrained approach to work at the Laboratory, coming from a research perspective and administered by managers brought up with that perspective, has fostered a resistance to more structured controls and formality for crosscutting work activities performed by many personnel working at LANL. As a result, the system lacks the document structure to facilitate clear communication of requirements to the working level, and a clear understanding of the importance to safety of proper procedure use and adherence. The variety and inconsistency of vehicles the Laboratory uses to communicate requirements and expectations down to the working level often lead to inaction or inappropriate, inconsistent action that directly impacts ES&H activities.

Potential Actions

- Strengthen, clarify, and communicate the sitewide management policy regarding the use of and adherence to procedures, providing unambiguous direction on when and how procedures are to be used and ensuring a clear linkage to accountability processes, including appropriate use of disciplinary action.
 - Establish a formal sitewide document management system for policies, plans, and procedures that provides a consistent, logical, hierarchical structure for the control and timely communication of requirements and expectations down to the implementation levels.
6. **Ensure that effective interim measures are in place to protect the health and safety of workers, the public, and the environment pending the full implementation of significant new safety management initiatives.**

Background

Several critical safety management program initiatives that directly affect the safe performance of work activities at LANL have long schedules for development and implementation. Recent events, near misses, and accidents reflect, as root causes, continuing performance weaknesses in key areas, including knowledge of requirements, work planning and control, procedure adherence, and electrical safety. While long-term solutions to these major issues are in various stages of development and implementation, the actions taken to prevent recurrence in the interim have often not been clearly or formally communicated, have evolved informally since issuance, or have not been effectively implemented. For instance, instructions issued in the form of a LANL Director's Policy regarding the need for hazard analyses for all work activities issued after the January electrical accident have been interpreted and clarified a number of times via e-mail, and was observed by Oversight to be ineffectively implemented.

Potential Actions

- Establish, document, and communicate formal interim directions within LANL site organizations specifying processes and expectations regarding the identification and implementation of ES&H requirements, pending implementation of an appropriate institutional requirements management program.
- Establish consistent LANL processes and minimum controls for planning and controlling work activities (including field changes to work scope) that encompass all work conducted at the Laboratory (maintenance, construction, program, and experimental), whether conducted by UC or subcontractor.
- Establish, document, and communicate formal interim directions within LANL organizations, facilities and personnel, providing clear and concise direction regarding measures to ensure electrical safety.

APPENDIX A

**EVALUATION APPROACH AND
TEAM COMPOSITION**

APPENDIX A

EVALUATION APPROACH AND TEAM COMPOSITION

CONCEPTUAL BASIS FOR EVALUATION

As a basis for Oversight evaluations of environment, safety, and health (ES&H) programs, the Department of Energy (DOE) Office of Environment, Safety and Health (EH) has formulated a conceptual framework that characterizes the principles, programs, and disciplines that are essential elements of a sound safety management program. This approach to oversight is based on the fundamental premise that line managers are responsible for managing safety through proper work planning, hazards analysis, and hazard control. The adequacy of the systems, processes, and procedures managers use to assure environmental protection and worker health and safety are assessed against a set of clearly defined principles and accompanying criteria. This generic framework can accommodate the wide range of operations, hazards, and management styles at DOE facilities. At the same time, the framework serves as a template against which managers can assess the adequacy of current safety efforts and from which, over time, an understanding of site-specific trends and inter-site comparisons can be drawn.

The conceptual framework centers around three of the five fundamental management principles¹ identified by DOE in an October 1994 letter to the Defense Nuclear Facilities Safety Board.

¹Five guiding principles are identified in the DOE's letter; line management responsibility for safety, comprehensive requirements, competence commensurate with responsibilities, independent oversight, and enforcement. The last two are performed by the Office of Oversight and other Departmental elements. The evaluation of Los Alamos National Laboratory focused on their effectiveness in implementing the first three of the five guiding principles, which are directly applicable to line management.

The letter included a comprehensive description of the functions that the Department deems necessary to fulfill its mandate under its enabling legislation to provide "reasonable assurance that the safety and health risk of operating personnel and the public be minimized."

An overall view of the process for evaluating the effectiveness of the implementation of each guiding principle and the overall safety management program is depicted in Figure A-1.

EVALUATION PRINCIPLES AND CRITERIA

The three applicable fundamental principles for an effective safety management program and the applicable evaluation criteria are shown in Figures A-2 through A-4. These principles are discussed in below.

Principle #1 - Line managers are responsible and accountable for safety.

Organizations that have effective safety management programs place accountability and responsibility for safety with line managers. Accordingly, line management personnel must ensure that the safety management program includes safety policies and goals that are clearly articulated and communicated; well defined responsibilities and authorities; effective management systems to identify, analyze, prioritize, and mitigate risks; and a process for ensuring that management is accountable for its safety performance.

Principle #2 - Comprehensive requirements exist, are appropriate, and are executed.

An effective safety management system must include processes to identify, communicate,

The apex reflects the evaluation of the Overall LANL safety management programs. It depicts a rollup of the three guiding principles determined by the Department as necessary for an effective safety management program.

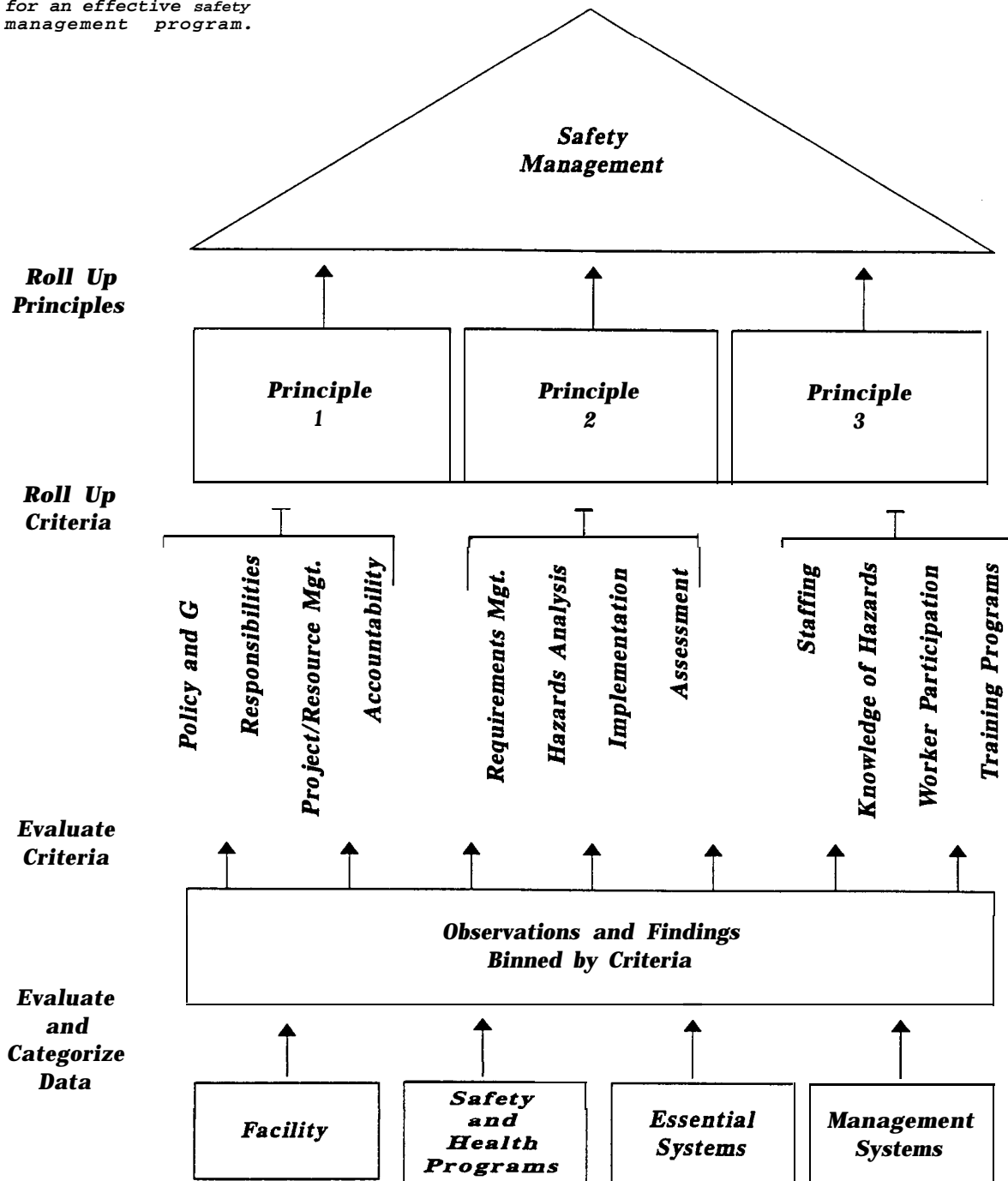


Figure A-1. Oversight's Evaluation Process

Principle #1 - Line managers are responsible and accountable for safety.

Criterion 1-1: Clear Safety Policies and Goals

Line management implements effective safety policy and goals that reflect Departmental policies and industry standards and assures a safety culture that permeates every level of the organization.

Criterion 1-2: Defined Responsibilities and Authorities

Line managers are responsible and accountable for ensuring that DOE facility operations and work practices are performed in a manner that provides adequate protection to worker safety and health, the public, and the environment. Accordingly, line managers must ensure that:

- A clear division of responsibilities is established and communicated.
- Line managers have the authority to make and implement decisions regarding ES&H that are commensurate with their responsibilities.
- There are clear mechanisms throughout the line organizations for adjudicating disputes among line managers where discrepancies are believed to exist between work goals and ES&H management needs.

Criterion 1-3: Project and Resource Management Systems

Decision makers at appropriate levels of the organization must be capable of understanding and synthesizing program goals and ES&H risks in order to effectively deploy resources adequate to address both. Line managers must manage safety and its attainment by establishing management information systems to ensure that:

- Hazards are analyzed and understood.
- Appropriate hazard mitigation actions are identified and are in place.

Criterion 1-4: Line Management Accountability for Performance

Line managers are accountable for ES&H performance. Performance should be explicitly tracked and measured, and inadequate performance should have visible and meaningful consequences. Line managers must execute actions to attain and continuously improve the safety of their operations by ensuring that:

- Safety-related matters are reviewed, monitored, and audited on a regular basis.
- Findings resulting from these reviews, monitoring activities, and audits are resolved in a timely manner.

Figure A-2. Criteria for Principle #1

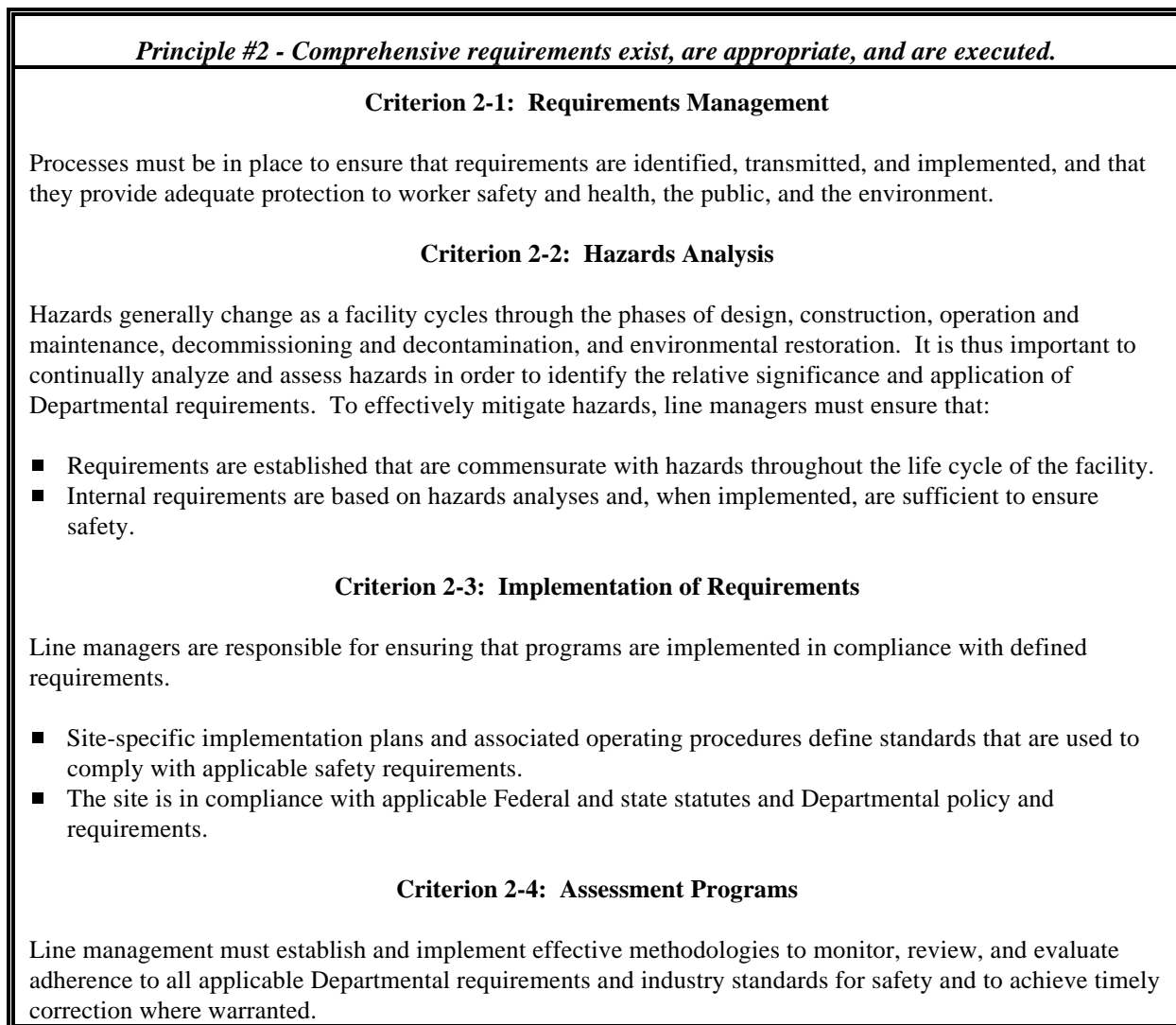


Figure A-3. Criteria for Principle #2

Principle #3 - Competence is commensurate with responsibilities.

Criterion 3-1: Staffing and Qualifications

The organization supports effective safety management by assuring appropriate levels of staffing and competence at every level. The organization has in place the means to:

- Determine the appropriate levels of staffing, experience, and training for each function, including consideration of responsibilities, activities, hazards, and schedules.
- Assure that subcontractors employed on site are adequately trained and qualified on job tasks, hazards, and DOE and contractor safety policies and requirements.
- Clearly identify vertical and horizontal lines of interface, communication, and support.
- Provide managers and supervisors with sufficient authority, staffing, and support to implement assigned responsibilities, analyses, and decisions.
- Develop and implement strategies for recruitment and retention of competent personnel.

Criterion 3-2: Technical Competence and Knowledge of Hazards

Workers and managers are technically competent to perform their jobs and are appropriately educated and knowledgeable of the hazards associated with site operations. Line managers must ensure that:

- Workers have the technical capability to recognize and respond appropriately to workplace hazards.
- Management, technical staff, and workers have the necessary levels of education, training, and experience.

Criterion 3-3: Worker Participation and Empowerment

Line managers recognize that active participation by workers is essential in maintaining and improving protection to worker safety and health, the public, and the environment. Therefore, line managers must ensure that:

- Workers and managers are empowered to take appropriate action in the face of hazards encountered during normal and emergency conditions, including the right to refuse unsafe work assignments.
- Processes for raising safety issues are established.
- Incentives are in place to promote a safety-conscious culture and worker participation and involvement in safety management.

Criterion 3-4: Training Programs

Line managers must establish and implement processes to ensure that training programs effectively measure and improve performance, and identify additional training needs.

Figure A-4. Criteria for Principle #3

execute, and monitor all applicable requirements, including Federal and state regulations as well as DOE requirements. Accordingly, responsibility for managing requirements must be established, a hazards analysis process must be implemented and applicable requirements identified and translated to procedures, procedures must be implemented by personnel in the facilities, and systems to assess compliance and effectiveness and to correct non-compliant conditions must be in place.

DOE is in the midst of a significant change in its approach to analyzing hazards and identifying applicable requirements that must be implemented to control those hazards. Most notably, DOE is transitioning from orders to rules. The criteria for Principle #2 are intended to be sufficiently flexible to encompass all of the current and developing approaches to analyzing hazards and identifying appropriate requirements. The following paragraphs clarify the scope of the individual criteria under this principle.

The first criterion focuses on the management functions that are necessary to implement hazards analysis processes. Included in this criterion are functions such as identifying individuals and teams to conduct hazards analyses at various facilities, assuring that the necessary resources are available, prioritizing activities, reviewing progress and status, maintaining documentation, establishing configuration control, evaluating and approving site-specific processes, and determining whether expectations are being met. In short, the first criterion focuses on the infrastructure underlying the second principle.

The second criterion focuses on the effectiveness of the actual process for analyzing hazards and identifying requirements. It encompasses the processes for translating the applicable requirements to site- and facility-specific procedures, and for updating those procedures as conditions change. The emphasis is on whether the processes used at the site are achieving the desired goal, which is a set of requirements and procedures that, if implemented, will effectively control the hazards. Also important is whether the site has a formal, current authorization basis for its facilities and whether the site is meeting estab-

lished commitments for developing such an authorization basis.

The third criterion focuses on implementation of requirements sitewide and at specific facilities. The emphasis is on whether the requirements are understood at the working level, and implemented as intended.

The fourth criterion encompasses the various programs that assess compliance and effectiveness and provide feedback to line management. These include self-assessments, surveillance, audits, quality assurance, management walk-throughs, and similar formal and informal measures.

Principle #3 - Competence is commensurate with responsibilities.

A fully functioning safety management system will have workers and managers who are technically competent to perform their jobs and who are appropriately educated and knowledgeable of the hazards associated with site operations. Management must assure that effective training programs are in place and that sufficient qualified staff are available. Workers must have the technical capability to recognize and respond to workplace hazards. Active worker participation in maintaining and improving the safety and health of workers, the public, and the environment, including workers' ability to stop work when they recognize unsafe practices, are recognized, is essential.

EVALUATION RATING SYSTEM

The ratings for each of the guiding principles and the safety management program are graphically represented using a color rating scheme. The colors and their meanings are as follows:

Green:	Effective performance.
Yellow:	Improvement needed
Red:	Significant weakness

This color rating system is not intended to provide a relative rating between specific facilities or programs at different sites because of the many

differences in missions, hazards, facility life cycles, and use of sampling techniques.

A "green" rating denotes effective performance, reflecting effective implementation of the Department's standards for an effective safety management program (the template with its associated criteria). Although some deficiencies or issues may have been identified during an evaluation, a green rating is appropriate if those deficiencies or issues do not degrade the overall effectiveness of the program.

A "yellow" rating indicates that improvement is needed. Deficiencies identified are more substantial and systemic and require significantly increased management attention.

A "red" rating indicates a significant weakness that requires immediate senior management focus, attention, and action. A red rating normally indicates significant programmatic or systemic weakness that is pervasive or of high consequence to the overall effectiveness of the safety management system.

Each of the guiding principles that constitute the basis for establishing an effective safety management program is a crucial element of a process to ensure that DOE-controlled operations are performed in a manner that will protect workers, the public, and the environment. Using these principles and their associated criteria to evaluate safety management program effectiveness requires careful consideration of the nature of the specific activity or facility being reviewed, its relationship with and impact on other activities and facilities, its life cycle phase, and the risk it presents to the achievement of ES&H goals.

While the significance and application of each principle and its associated criteria may vary by circumstance, it is imperative that the implications of each principle for effective safety management be weighed and considered on the basis of hazards and risks to workers, the public, and the environment.

The guiding principles are interrelated and mutually supportive elements of the overall safety management system. Clear articulation and

communication of lines of authority and responsibility for safety must consider and correlate with the establishment and implementation of appropriate requirements. Personnel responsible for executing these requirements must understand the hazards and their roles in controlling the hazards, and must be competent to perform their assigned duties. Hence, the evaluation of the safety management system must consider the guiding principles both individually and in concert.

The process for evaluating the effectiveness of each guiding principle is as follows. First, the evaluation results are sorted and binned according to the individual criteria, and each criterion is evaluated and rated individually. Next, each principle is evaluated according to the associated criteria, considered separately and collectively—that is, the evaluations of individual criteria results are "rolled up" to a higher level evaluation of the individual guiding principles. Finally, the overall safety management program is evaluated and rated by "rolling up" the evaluation of the individual guiding principles.

The rollup process is not a mechanical or numerical scoring exercise. Rather, it is a deliberative process involving all levels of the Oversight evaluation team, from the inspectors who examine individual facilities and topics to the evaluation team management and the Deputy Assistant Secretary for Oversight. The rollup evaluations consider:

- Whether risks to ES&H currently exist or will exist in the future if present circumstances remain unchecked
- Whether the risks are unique to a specific criterion, principle, activity, or facility
- The synergistic effects of two or more principles or criteria
- Initiatives that are planned or in progress, and their expected results
- The impact that the level of adherence to a specific principle or criterion has on the effectiveness of the overall safety management program.

In practice, the evaluation process involves a number of iterations to assure that the results are valid and representative of the safety management program.

EVALUATION PROCESS

The Office of Oversight's evaluation process measures the effectiveness of DOE and contractor line management in achieving ES&H objectives. The goal of the approach used is to fairly and accurately assess the effectiveness of a site's overall safety management program in a way that provides value to line management.

This process focuses on safety management in the context of the guiding principles rather than on serial evaluations of individual issues or technical disciplines. The Office of Oversight strives to provide a balanced assessment of performance, emphasizing strengths as well as weaknesses. Rather than a list of non-compliances or specific deficiencies, evaluation results discuss root causes, systemic weaknesses, obstacles to improvement, and suggestions for approaching solutions. The program actively seeks and incorporates the insights and concerns of line management, workers, regulatory bodies, and other interested parties.

The evaluation was conducted according to formal protocols and procedures, including an Appraisal Process Guide, which provides the general procedures used by the Oversight program for conducting inspections and reviews, and a Safety Management Evaluation Plan, which outlines the scope and conduct of the evaluation. Training sessions were conducted to ensure that all team members were informed of the evaluation objectives, procedures, and methods. The evaluation team collected data through interviews, document reviews, walkdowns, observation of activities, and performance testing. Interviews were conducted with program office, operations office, area office, and contractor personnel, including managers, technical staff, hourly workers, and union representatives.

The priorities and focus of the evaluation centered on the site facilities, hazards, vulnerabilities,

issues, and ongoing activities. Performance weaknesses, vulnerabilities, and data were examined for all major facilities and major ES&H topical and functional areas. Available data from other sources, such as DOE Headquarters reviews, operations office and area office appraisals, EH Resident surveillances, Defense Nuclear Facilities Safety Board letters and trip reports, information from the Occurrence Reporting and Processing System, and the performance indicator program, were included in the scope of this evaluation.

Based on the review of documents and tours during the planning process, the Oversight team primarily on selected facilities and programs for primary focus. At each site, the team conducted vertical reviews to determine the effectiveness of the safety management system in place. The vertical reviews examined selected programs, such as radiological protection. These vertical reviews examines program's policies and management programs, as well as their implementation at selected facilities and process operations, addressing of procedures, hardware, and knowledge and qualifications of personnel on the "shop floor." During the planning process, the Oversight team also identified a number of site-specific focus areas, such as work planning and employee involvement, which were reviewed in depth.

Templates for collating data on a daily basis were used as an internal team communication and analysis tool. Weaknesses, strengths, and other indicators were entered into the template daily and used for coordinating the flow of data. The template was designed for ease of analysis relative to a specific guiding principle and associated criteria. This analysis formed the basis for integrating information, identifying management issues, developing ratings for performance under each guiding principle and its criteria, and writing the evaluation report. The analysis of data also provided the basis for redirecting the team during the evaluation, as necessary. The information was evaluated and analyzed daily by evaluation team management and the management team.

At all stages of the process, the preliminary results were shared with representatives of the Headquarters Office of Defense Programs, the Albuquerque Operations Office, the Los Alamos Area Office, and site contractors. Their comments on the factual accuracy and completeness of the data helped determine the validity of the data and guide additional data collection efforts as appropriate. Key facts and issues were reviewed daily with site points of contact to verify their accuracy. Team management provided daily morning debriefings to site management on emerging issues.

Based on observations, the team analyzed the effectiveness of program elements with respect to each criterion and each guiding principle. Results and conclusions were documented and ratings assigned. The team evaluated potential options for improving operations and generated candidate actions for enhancing the safety management system. Finally, the report was reviewed by a management review board consisting of senior analysts and managers to ensure that the reported results reflected objectivity, comprehensive analysis, and supportable conclusions. The results of these efforts were provided in a draft report to DOE management for factual validation at the exit briefing.

The results provide useful insight into the effectiveness of the overall safety management programs at Los Alamos National Laboratory (LANL). Evaluation results should be viewed in the context of the scope of the evaluation and the sample of facilities and topics selected for review. Strengths and weaknesses identified during this evaluation may not be representative of all other areas and contractors. Nonetheless, since the facilities and programs selected for evaluation encompass a diverse cross-section of the site activities and ES&H programs, the Oversight team believes that the facilities selected for review represent a valid sample of overall ES&H safety management program performance.

TEAM COMPOSITION

To reflect the emphasis placed on the three guiding principles of safety management, a core

group of safety management specialists evaluated the application of these principles, with specialists focusing on each of the three guiding principles.

In addition, specialists were assigned to collect data at selected LANL facilities. Because of the scope of the LANL evaluation, the LANL facility team was organized into three subteams, each of which evaluated a specific aspect of the program (operations management, worker safety and health management, and environmental management). The specialists on the facility teams were assigned to evaluate the effectiveness of various implementing programs or technical disciplines (radiological protection, conduct of operations, waste management, construction safety, industrial safety/hygiene, maintenance, occupational health/medical surveillance, process safety, essential systems, engineering/configuration management, surface water, work planning, criticality safety, decontamination and decommissioning, and environmental restoration).

Team composition is as follows:

Deputy Assistant Secretary for Oversight

Glenn Podonsky

Associate Deputy Assistant Secretary

Neal Goldenberg

Director, Office of ES&H Evaluations/Team Advisor

S. David Stadler

Team Leader

Michael Kilpatrick

Deputy Team Leader

Frank Russo

Associate Deputy Team Leader

Harry Pettengill

Line Management Responsibility

Thomas O'Connor
Robert Freeman
David Berkey

Comprehensive Requirements

Patricia R. Worthington
V. Pasupathi

**Competence Commensurate
with Responsibility**

Ali Ghovanlou
Robert McCallum

LANL Facility Team

Thomas Staker - Facility Team Leader

Operations Management

Richard Lagdon (Conduct of Operations)
Bradley Davy (Work Planning and Control)
Edward Stafford (Conduct of Operations)
Robert Compton (Maintenance)
Spyros Traiforos (Engineering/Configuration
Management)
Paul Wu (Engineering/Configuration
Management)
Ivon Fergus (Criticality Safety)

Worker Safety and Health Management

Robert Crowley (Construction Safety)
Marvin Mielke (Occupational Health)
Kathy McCarty (Radiological Protection)
James Lockridge (Industrial Safety/Industrial
Hygiene)
Thomas McSweeney (Process Safety)
Jerry Martin (Radiological Protection)
Richard Green (Decontamination and
Decommissioning)
Mark Good (Electrical Safety)
Robin Siskel (Radiological Protection)

Environmental Management

Victor Crawford (Waste Management)
Andrea Heintzelman (Environmental
Restoration)
Raeanne Reid (Surface Water)

Administrative Team

Mary Anne Sirk
Tom Davis
Kathy Moore
Tracey Blank
Jan Hill
Kelly Williams
Yolanda Parker

Quality Review Board

Neal Goldenberg
Mari Jo Campagnone
Dean Hickman